OCT 1918

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a. Write on one side of the paper. Type-written MS. is preferred.

b. Write without breaks, *i. e.*, do not begin each sentence on a new line. When you want to begin a new line or paragraph at a given word, place before it in your MS. the sign ¶.

c. Draw a line along the margin of such paragraphs as should be printed in smaller type—for instance, all that is clinical history in reports of cases, etc.

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e. Let the title of your paper indicate its contents. If it is a general title, for instance, Clinical Contributions, mention the subject of each special communication,—for instance: CASE I. Sarcoma of Iris; CASE II. Exostosis of Frontal Sinus, etc. These special titles will appear in the table of contents of each number and each volume, under the heading of the general title, so that they will not be overlooked.

f. Illustrations should be carefully drawn on separate sheets.

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About three quarters of the space is devoted to original papers, and the remaining quarter to a systematic report on the progress of ophthalmology, and to reports of societies, book reviews, and miscellaneous notes, all of it original.

The papers and reports are original, and only accepted with the understanding that they are to be published in this journal exclusively. The original papers in the English edition appear in the German (*Archiv für Augenheilkunde*) either in full or in more or less abridged translations, and *vice versa*. Any subscriber who wishes to refer to the original text of a translated or abridged paper may, by applying to the editors, obtain a reprint which he is expected to return after perusal. The subscription price of the ARCHIVES OF OPHTHALMOLOGY is $5.00 per year payable in advance. The price per number is $1.00.

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ARCHIVES OF OPHTHALMOLOGY.

SOME OCULAR CONDITIONS AFFECTING THE EFFICIENCY OF THE AVIATOR.[1]

BY COLONEL WILLIAM H. WILMER, MEDICAL CORPS, N.A.

(With six illustrations in the text.)

THE medical problems involving the aviator are unique. The airman is compelled to spend much time in an unaccustomed environment. In addition to the stress of conflict common to all branches of military service, he is compelled to subject himself to sudden changes—so sudden that there is but little opportunity for adaptive adjustments to occur. There are sudden changes of temperature, barometric pressure, muscular and mental exertion, from ground to labile equilibrium, from normal sea-level oxygen tension to a tension much decreased.

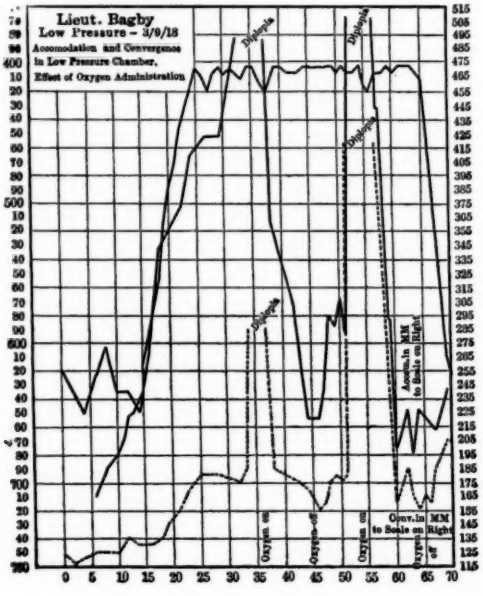
Under conditions of lowered oxygen certain well-known physiological changes occur, which are adaptive in nature. There is a cry for help from the tissues of the body which demand more oxygen. The blood stream is not only a sewer carrying off waste products but a nutrient fluid and a carrier of oxygen. This appeal for succor is met in good subjects by an increase in depth of respiration, by the dilation of peripheral vessels, and by more rapid heart-beats. More frequent respiration and an increased blood pressure are clumsy attempts at adaptation, and the airman soon breaks

[1]Read at meeting of American Ophthalmological Society, New London, July, 1918.

under such tension. In the blood itself, there are changes consisting of concentration and an actual increase of available red blood corpuscles.

At the Medical Research Laboratory, the conditions of lowered oxygen tension are produced artificially by two different forms of apparatus:

(1) A large low-pressure chamber from which the air is



removed by an electrically driven pump, the oxygen tension and the barometric pressure being simultaneously lowered, while the amount of CO_2 increase in the chamber is negligible, owing to the good ventilation.

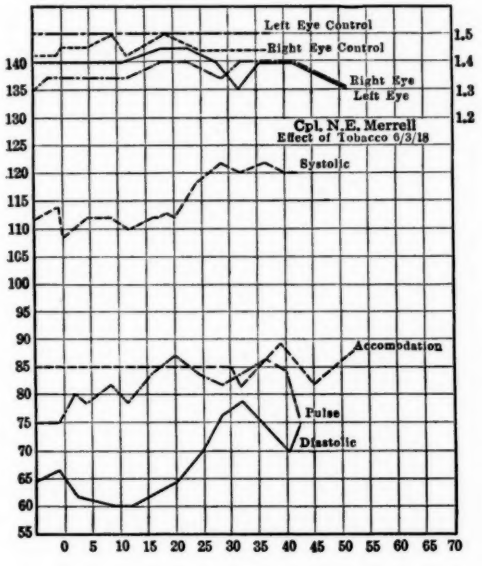
(2) The Henderson rebreathing apparatus, where the subject breathes up his own oxygen from a tank, the excess of CO_2 being absorbed by sodium hydroxide.

Tests made by these different forms of apparatus correlate so closely that we are compelled to believe that the physiological changes noted are due to the want of oxygen and not to

the lessened atmospheric pressure. This is further proved by the fact that the administration of oxygen causes a quick return of the disturbed functions to the normal.

It is difficult to say how much of the disturbance of function is due to suboxidization in the central nervous system and how much is due to changes in the muscles themselves. At all events, the results are strikingly similar to the toxic effect of alcohol, etc.

In various accident reports from aviation sources there



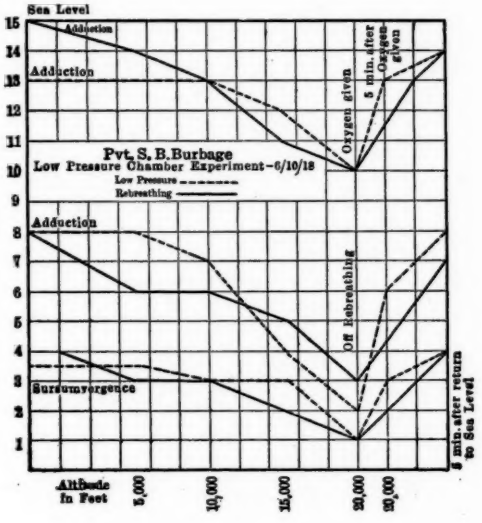
is constant reference to the statement by pilots that vision was blurred during flight. In many cases the instruments could not be read correctly, distance from the ground properly judged, etc. We have, therefore, been interested in making our tests under conditions of lowered oxygen pressure to see just what changes do occur in the various functions of the eye. It is well known that the visual requirements for the air service of the United States are much stricter than

those of any other nation, and there have not been many instances where careless selective examinations have passed candidates with defective vision or muscular imbalance. The fact that the ocular functions (especially the motor apparatus) do fall off in an atmosphere of reduced oxygen pressure convinces us of the continued necessity of high entrance requirements. The acuteness of vision, of course, is the most important ocular asset of the aviator. In testing this function under low oxygen conditions, a number of factors have to be considered, such as practice, suggestion, concentration, etc. On the whole, we have not found any *very marked* change in the acuteness of visual perception. The great variations have been due to the falling off in the power of muscular adjustment. For instance, in hyperopic individuals there is likely to be a deterioration owing to the reduction in the power of the ciliary muscle. On the other hand, in those slightly myopic, there is a tendency towards improvement, for the same reason. Our experimental and practical experiences have not borne out the statement of some of our confrères that vision in the air is improved at the height of about 200 meters, owing to a congestion of the head, the choroid, and the retina. To test this, we tried the effect of nitrite of amyl on the sight of a number of observers. There was falling off in vision in every instance except in one myopic subject, where there was improvement.

Normal color vision is most important for the aviator; but we have found very little practical change in this function though there have been found some alterations of its threshold values.

A large field of vision is very necessary for a good aviator. This is especially important because the fuselage causes such a large blind angle in the visual field. In the tests of the visual fields some rather definite changes have been noted, in some instances indicating that the periphery of the retina is much more sensitive to oxygen want than the macular region, either through the nervous apparatus of the retina itself or through suboxidization in the perceptive centers. While in the average we have not found any great change, in some cases up to 10,000 feet the visual fields seem to increase; about 15,000 feet there is a slight contraction; at 20,000 feet there is a marked contraction for form and color.

Retinal sensitivity is not tested in the original selection of the aviator; but later, in his classification, this test is essential, and it is also necessary to determine whether this function is diminished under certain air conditions. The test for threshold retinal sensitivity is interesting and, for laboratory purposes, a very practical and exact test. However, it requires too much time to be useful as a quick clinical test. So, in substitution for this, we use a comparative sensitivity test.

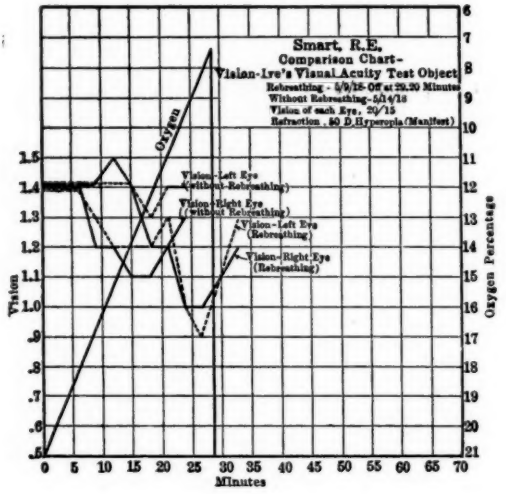


In this test the object is a gray letter on a lighter gray background, there being thirteen shades of perceptible difference between them. One eye is closed and the photometric wedge is passed before the other eye until the letter blends in to the background and can no longer be recognized. The point at which this occurs is noted on the millimeter scale of the wedge. The time allowed for the process is from five to eight seconds. It is repeated three times for each eye. The wedge that is used was devised by Lieutenant Reeves. It consists of a layer of gelatine of increasing density of color between two pieces of optical glass. The light transmission has

been calculated for each millimeter on the scale, and the normal has been established by repeated tests at the laboratory.

The function of perception of light and motion is among the first developed of all ocular percepts. The quick and accurate perception of motion is very valuable to an aviator. As has been stated before, Nungesser, the famous French ace, said: "You need eyes all around your head and after a time, you get them."

With the subject placed fifteen inches from the test screen,


Smart, R.E.
Comparison Chart-
Vision-Ives's Visual Acuity Test Object
Rebreathing - 4/9/18- Off at 29.20 Minutes
Without Rebreathing-4/14/18
Vision of each Eye, 20/15
Refraction .40 D Hyperopia (Manifest)
OXYGEN
Vision-Left Eye (Without Rebreathing)
Vision-Right Eye (Without Rebreathing)
Vision-Left Eye (Rebreathing)
Vision-Right Eye (Rebreathing)
Vision
Oxygen Percentage
Minutes
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
1.5 1.4 1.3 1.2 1.1 1.0 .9 .8 .7 .6 .5
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

the threshold perception of motion covers a field about five degrees larger than that for the detection of form, but our tests at the laboratory show that the *field for the accurate* perception of motion direction is usually about three degrees less in all quadrants than the field for form, as *usually* taken.

Stereoscopic vision does not, according to our experience, suffer any very serious impairment in oxygen deprivation.

The test for the simple visual reaction time has not appeared to us to be of much practical value. In this test, the one possible reaction to the one possible stimulus becomes practically an automatic reflex. However, the Reeves visual

discrimination reaction time test is of much ophthalmo-psychological value. In this test there are four possible correct reactions to five possible stimuli. This act involves the higher mental processes and cannot become a simple reflex. In the laboratory, the average reaction time of this test is one half second, while the time given by many observers for the simple visual reaction is one nineteenth of a second.

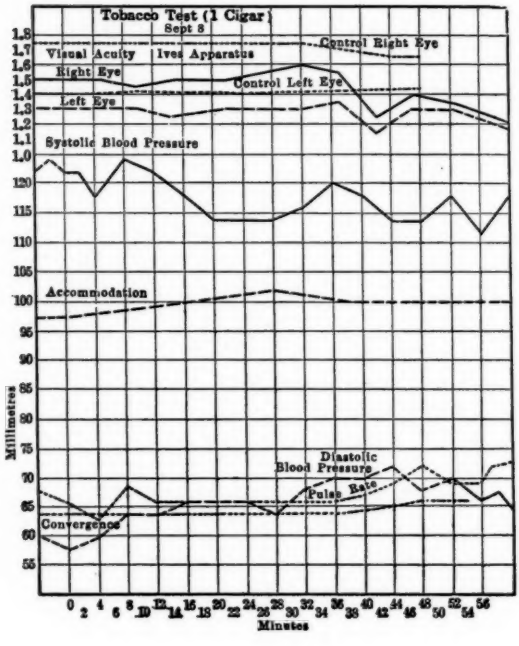
After all, the serious ocular disturbances produced in the peculiar environment of the airman take place in the intrinsic and extrinsic muscular apparatus. There is in many cases a falling off in the power of accommodation, convergence, and, naturally, in the field of binocular fixation. To illustrate this point, several diagrams are shown.

With the failure of accommodation, it is impossible to read the figures upon the ever-increasing number of instruments in the fuselage. The pilot has to shift his gaze quickly from the great expanse around him to the cockpit. Therefore his accommodation must be not only accurate but free from abnormal lag, otherwise the penalty is a broken machine, with the injury or death of the pilot. So, too, the failure in convergence means double, confused, and a danger-breeding vision.

While it does not bear directly upon the problems of aviation, as a bi-problem the intraocular tension has been tested under conditions of much reduced barometric and oxygen tension. In these tests no correlation has been found between these conditions, nor between the intraocular tension and the varying blood pressures occurring in a rarefied atmosphere. But more closely related to the problems of aviation are the effects of nicotine (or allied substances) upon the ocular functions. With reference to these effects upon the eyes and blood pressures of non-smokers, sixteen subjects have been tested in the laboratory, the smoking of one cigar being the time limit of the test. In twelve cases, there was loss in visual acuity; in one there was gain; while in three there was no change. In about one half of the cases there was a falling off in the motor apparatus of the eye. In regard to the interesting subject of blood pressure, it is sufficient to say, without going into details, that about 69% of the cases showed a rise in both systolic and diastolic blood pressure.

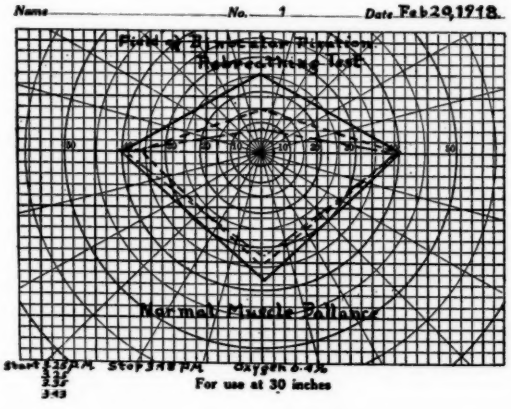
After months of serious thought and work on aviation problems, we have asked ourselves:

After all, what conclusions can one draw from this experience with an organ so wonderful in its fine adjustment that it can be compared, as Reeves has said, to a marvelous balance that can "with equal accuracy weigh a hair or a ton of coal"?



While the eye is only one of the peripheral sense organs concerned in the function of equilibrium, it is second to none in importance. We have found that its proper functioning is affected by oxygen want apart from the other trying conditions of flying, and we are more and more impressed with the vast importance of the initial selection of candidates who possess good eyes and well-balanced muscles, who have good adduction, and who are practically free from hyperphoria.

Equally important is the proper classification of the cadet, that he may be assigned to the type of work for which these laboratory tests have shown that he is best fitted. A cadet with low retinal sensitivity could not be a night bomber. A candidate who fails to read his instruments correctly and sees double at 10,000 feet could not be a pursuit or combat pilot. Once classified, the pilot should not be lost sight of.



The unceasing care of the flyer is the culminating duty of the flight surgeon.

A slack wire on a control is not as dangerous as a poor convergence. After the strain of service a tendency to a weak muscle becomes a manifest error. A weak convergence becomes a dynamic divergent squint.

By the aid of laboratory tests and by the constant, watchful care of the flight surgeon and of the physical director, many cases of incipient staleness can be detected and prevented, much economic waste can be prevented for the Government, while valuable young lives will be saved.

THE NEED OF AN OPHTHALMOLOGIC CLINIC IN PENAL INSTITUTIONS. WITH SPECIAL REFERENCE TO ONE ESTABLISHED AT SING SING PRISON.

By Dr. CONRAD BERENS, Jr., Captain, M.R.C., New York City.

AN experiment in sight-saving work was undertaken by the New York State Commission for the Blind, in April, 1916, through the establishment of an eye clinic in Sing Sing prison. This clinic was the outcome of two requests to the Commission from inmates. One man, who was blind, asked that some employment be found for him on his discharge, which would occur in a few weeks. The other, with a serious eye condition, asked the Commission to assist in securing a pardon in order that appropriate treatment might be instituted in time to prevent blindness.

Inquiry made in the interest of these two men disclosed the fact that a score of inmates of Sing Sing had serious eye affections for which the appropriation was insufficient to provide other treatment than that offered by the prison physician, and the services of an inmate jeweler who had been taught optometry.

The clinic was opened in April, 1916, and in less than a year became one of the most effective services which the Commission rendered the State in saving, not only eyesight for its citizens, but also dollars for its treasury, since blind citizens must often have supplementary assistance in industry and in maintenance.

Before the establishment of this clinic, an inmate optometrist was doing the refraction, which was assumed to cover the necessity for glasses and eye treatment in Sing Sing prison. From the cases under observation, it would appear that both

eyes were examined at the same time; therefore, if the vision of one eye was normal, both eyes were considered normal. In high myopia, the method was to increase the strength of the minus lenses as long as the patient said the letters looked "darker." Furthermore, numerous patients suffering from serious conditions, such as optic atrophy, cerebrospinal lues, detached retina, etc., received lenses but no local or general treatment. A study of the records shows that unless the sight of a patient was improved by lenses, he was thought not to need them. All of these conditions were to be expected, since the inmate who had been taught to refract knew nothing of general medicine, and could not legally use a cycloplegic.

This inmate optometrist was, however, a very careful and conscientious man, and with instruction in the technique of refraction gave valuable assistance in the development of the clinic. This important part of the clinical service was seriously threatened by the withdrawal on parole of this assistant; the situation was saved, however, as funds for his salary were obtained. This man has proved indispensable in developing many phases of the clinic's work. His value is reflected in the changed attitude of the patients, who have gradually come to a genuine coöperative spirit in recognizing the importance of the anamnesis concerning their physical condition and the relation of other physical ailments to eye conditions, as well as the importance of prompt and faithful treatment in preventing defective vision and possibly blindness.

At present the work is done in a large clinic room 25 x 15 feet, one corner of which has been curtained off as a dark room. The operations are performed in the general operating room. The clinic, dark room and operating room are as well equipped as many in the smaller hospitals, and, except for the difficulty in training men to observe the rules of asepsis, everything runs smoothly.

At the outset, it was obvious that the clinic should have proper histories, if good work were to be accomplished. Accordingly a card was devised which not only seems to fill most of the requirements of the work in hand, but is also revealing facts of more general interest. For instance: that a majority of these inmates have had less than seven years' schooling, that quite a considerable number are having their first educa-

tional classes within the prison. Many in each of these groups have had, since early childhood, myopic or other eye conditions which may have contributed to early delinquency and have been the means of substituting street trades for employment in such occupation as would furnish incentive for wholesome mental development.

In this phase of the service, another inmate has become indispensable, and by his services makes the clinic as efficient as many in the larger hospitals. This man is an expert stenographer, with more than the average layman's intelligence for medical facts. He is in constant attendance when the history is taken, at treatments and during operations, making accurate and detailed medical histories possible.

We have received the most cordial coöperation from all the officials at the prison and from the Department at Albany. Eye conditions are now considered in referring inmates for employment. For instance: a myopic patient is not sent to the knitting shop; and optic atrophy, iritis, and similar conditions exempt the inmate from employment which might be injurious to his eyes. Diagnosed eye conditions or suspicious symptoms of the same exempt inmates from draft to other prisons.

STATISTICAL REPORT

Classification of Diagnoses		*Classification of Operations*	
Marg. blepharitis	17	Pterygium, transplantation	1
Tumor of orbit (sarcoma)	1	Pterygium, excision of	5
Ptosis, congenital	2	Trachoma, scarification, and exp.	1
Cellulitis of lid	1	Enucleations	13
Chalazion	18	Glaucoma, Elliot's trephine	2
Foreign body, lid	2	Senile cataract, preliminary iridectomy	1
Atrophic globe	11	Secluded pupil, iridectomy	2
Anophthalmos	9	Glaucoma, iridectomy	4
Dacryocystitis	9	Traumatic cataract, needling	2
Chronic follicular conjunctivitis	70	Traumatic cataract, linear extraction	2
Acute foll. conjunctivitis	10	Contracted cul-de-sac, plastic op.	2
Catarrhal conjunctivitis	5	Dacryocystitis, excision of sac	1
Foreign body, conjunctiva	2	Excision of papilloma of lid	1
Keratitis	2	Resections	7
Pterygium	6	Tenotomies	6
Old trachoma	14		
Acute trachoma	1		
Trachoma with pannus	1		

Classification of Diagnoses

Corneal ulcer	3
Anterior staphyloma	3
Abrasion of cornea	6
Macula corneæ	29
Burns of cornea	1
F. B. cornea	5
Iritis	11
Iridocyclitis	4
Traumatic cataract	6
Senile cataract	2
Dislocated lens	1
Chronic glaucoma	6
Retinitis	3
Choroiditis	3
Uveitis	3
Convg. strabismus	15
Divg. strabismus	16
Alt. strabismus	10
Paralysis of superior rectus	3
Optic atrophy	13
Detached retina	3

Refraction

Hyper. astigmatism	65
Comp. hyp. astigmatism	18
Mixed astigmatism	28
Comp. myopic astigmatism	22
Myopic astigmatism	10
Hyperopia	130
Myopia	59
Presbyopia	40

Classification of Operations

Chalazion, scarification, & exp.	10
Ptosis, removal of redundant tissue	6

Of the 13 optic atrophy cases, 13 give a specific history, and 6 show dental infection in addition.

Of the 11 iritis cases, 8 give a specific history. Focal infection seemed to be the sole cause in two patients, and focal infection may have been a contributing cause in three others.

Uveitis: 2 show a specific history, with dental infection.

Total patients registered to date	484
Average weekly attendance at clinic	28
Visits to clinic by patients	2088
Men sent from other prisons for eye treatment	10

TYPICAL HISTORIES

CASE 1. W. W., 28 yrs. Colored. Corrected vision: O. D. $\frac{20}{30}$ O. S. fingers at 1 ft. Referred to ophthalmological department, June 5, 1916, complaining of failing vision in the left eye. A diagnosis of uveitis was made. He denied specific history and the Wassermann was four plus. He was referred to the dental department where several roots were extracted to permit alveolar abscesses to drain.

January 29, 1917. Eye quiet. Has received specific and dental treatment. Corrected vision: O. D. $\frac{20}{20}$; O. S. $\frac{20}{40}$.

CASE 2. I. S., 29 yrs. White. Vision: O. D. no L. P.; O. S. $\frac{20}{40}$. Referred to ophthalmological department

December 18, 1916, complaining of pain in the right eye, blurred vision, photophobia, and lacrimation in the left. Injury to right eye twelve years ago. January 1, 1917, enucleation, O. D. January 16, 1917, O. D. wound healed. O. S.: eye quiet, no photophobia. February 27, 1917, given artificial eye. March 19, 1917, transferred to Great Meadows prison. June 20, 1917, sent another artificial eye, as the first was broken.

From a survey of the diagnoses, it will be seen that a large proportion of the patients referred are suffering from eye affections which are known to result disastrously if neglected or carelessly treated. It is a distinct advantage that patients giving a specific history and a positive Wassermann or such symptoms as make the diagnosis sure have not the freedom of the outside patient to refuse treatment, or to defeat successful treatment by migrating from one clinic to another. Syphilis is usually diagnosed at the time of the preliminary examination since the present system has been in force. Inmates committed prior to the establishment of routine physical examination are referred at the first warning symptom and treatment instituted. The benefit received by these patients is so generally recognized in the prison population that results are becoming much more satisfactory on this account.

Inmates, on commitment, are referred to the clinic as a routine measure. At the first visit the history is taken, the eyes thoroughly examined, and a careful preliminary refraction is made. We find upon examination myopic conditions which have been neglected since childhood, old trachoma capable of improvement by treatment, injured eyes needing enucleation to prevent sympathetic ophthalmia, beginning optic atrophy, and many other conditions requiring treatment. Refraction has been found to be the only treatment necessary in 282 cases. In a majority of the other cases, refraction has been included in the treatment; as in cataract, strabismus, and marginal blepharitis.

Of the patients referred, 35% give a specific history, and in a series of Wassermann tests taken as a routine on one hundred inmates, 31% were positive. In the table of diagnoses we have shown some of the eye conditions which prevailed in this group of syphilitics. One patient had five distinct attacks

of iritis in a period of nine months. That these two groups of inmates alone fully justify this service on the part of a Commission which would prevent blindness is seen from the case notes given from typical history cards.

In the prison population of fifteen hundred men, we have an average attendance of twenty-four on clinic day.

There are many men in the prison with normal vision in one eye, but not even light perception in the other, owing to a previous injury. They have never thought it necessary to have their eyes examined, since "they have one good eye." We have been able to emphasize the importance of enucleating the injured eye in order to preserve sight in the good one.

The other prisons in the State have sent ten men to Sing Sing for eye treatment—one for enucleation, on account of sympathetic ophthalmia.

To emphasize the importance of the plan for physical examination of prisoners on admittance, it may be interesting to mention some of the cases which came under observation at the eye clinic previous to establishing these examinations.

One of the most pitiful that I recall was of an inmate who entered the prison with a progressive myopia. He was given glasses which were, in all probability, too strong for him and in the absence of treatment detached retina had developed in both eyes so that he only counted fingers at two feet. At the time I saw him first, his iris showed no signs of inflammation; later there developed an acute iritis, and unfortunately he was not brought to me again until the iris was so bound down that mydriatics were of no avail.

Another, a colored man, was brought to my attention, who had been suffering for several days with an acute iritis. He was only receiving argyrol and ice. Atropin and hot bathing immediately relieved the situation.

The help we have received from the prisoners has been mentioned, but the work could not have been carried out if it had not been for the labor of Doctors H. R. Skeel, W. W. Weeks, and W. B. Weidler, who have freely given one afternoon a week, and of Miss Farley and Miss Clendinning, the Commission's nurses, who have been at Sing Sing regularly twice a week. Their devotion has kept this valuable work alive.

All who have assisted at Sing Sing say that it means more to them than any other work they are doing, for they feel that it is not right to put a man in prison and then waive all responsibility for him. We should keep each man physically fit and thus enable him to do some useful work. For this he might well be paid an ordinary wage, with an increase for greater production. In this way a man could pay for his keep in prison, and if he has a family he could help to support it. At present, each inmate receives one and one half cents a day. The saddest thing about sending a man to prison is the usual story about the family, left at home.

While the man is in prison, it has been our endeavor to help fit him for the work he hopes to take up when he is released. Operations are performed upon the eyelids and ocular muscles in the hope of improving the man's appearance and several operations have been performed to make a socket for a glass eye. By this means it is made easier for the prisoner to obtain a position after his release, and more important still, he is more likely to hold it.

A follow-up system is in force, so that men who need further treatment after release will be properly cared for.

From the foregoing it is evident that there should be an ophthalmologic clinic in every penal institution in the United States and everyone should do all in his power to help his brother on the inside, for he is worthy of it and needs us.

THE RESULTS FROM 112 WASSERMANN BLOOD-TESTS IN THE MISSOURI SCHOOL FOR THE BLIND.

By Dr. J. W. CHARLES and Dr. HARVEY D. LAMB, St. Louis.

QUESTIONS are frequently asked consultants in schools for the blind which can only be answered by reference to statistics of certain classes of cases which are more apt to be grouped in such institutions than in the private practices of ophthalmologists—*e.g.*: "What percentage of cases have been caused by syphilis?" "How great a rôle has heredity played in the production of blindness?" "What kind of cataracts yield the best results from needlings?" and even "Do you expect much result from optical iridectomy?" etc.

The class of cases terminating in such a school, coming from lowly families and often from ignorant physicians, makes manifest the difficulties of obtaining complete or accurate histories in some instances, *e.g.*, we have two children (sisters) from a county poor-farm who have, the one a coloboma and the other an aniridia. These children's antecedents cannot be traced at all.

In the semester of 1916 to 1917, 79 out of 106 pupils of the Missouri School for the Blind gave their consent for a Wassermann. Since the institution belongs to the educational system of the State, it seemed impossible to require the test of those who were unwilling. During this semester, however, we admitted no pupils without sending them to Dr. Jeans of the St. Louis Children's Hospital who enlisted the aid of the laboratory of Washington University in our cause, and we now have the results of 112 Wassermanns from among 137 pupils:

Ophthalmia Neonatorum. There were thirty-five cases of

which nineteen were born in the country or small towns while sixteen came from cities of more than thirty thousand. Of these, three rural and two urban cases refused the test.

Of the thirty remaining cases only one was positive, a child of underworld parentage.

Thanks to our present law there have been very few cases to be admitted in the last three years.

Corneal Ulceration. Of seven cases of simple corneal ulceration (necessarily indefinite) one refused the test, the other six were negative: three were from the country and two were urban.

The only case of *Parenchymatous Keratitis* was strongly positive.

Trachoma. We were surprised to find that only five pupils had been made blind by trachoma. Two refused the Wassermann and three were negative. All were rural.

Malformations. Of the twenty-one cases, sixteen were from the country, five urban. Five declined the test. Of the remaining sixteen two were without doubt syphilitic but had been treated and gave a negative reaction.

Simple Trauma. These four cases were all rural and all negative.

Sympathetic Ophthalmia. Four of the ten cases declined the Wassermann. Seven were from the country and three were urban.

The six submitting were all negative.

Cataract. Seven of the cataract cases were urban, eight were from the country. Three of the fifteen pupils refused. All of the twelve remaining were negative.

There were three pupils from one family of hereditary cataract and two from another.

Progressive Uveitis. It has been so difficult, sometimes impossible, to obtain a history of many of our cases that it has been out of the question to make a differential diagnosis of the various forms of uveitis which have terminated in blindness, and the work of obtaining a thorough investigation of the causes has been hampered in many ways.

Six of the seven cases were from the country and the Wassermann was negative. The one urban patient had undoubted stigmata of hereditary syphilis yet gave a negative blood and

spinal, but the patient had been treated with mercury by the stomach.

Retinitis Pigmentosa. Of the five cases diagnosticated as retinitis pigmentosa, all were from the country, two declined the Wassermann and the remaining three were negative.

Retino-Choroiditis. There were five cases, four rural. All were positive.

Optic Atrophy. Of the seventeen cases, nine were from the city and eight from the country. Three refused the test. Nine were negative, five were positive.

Miscellaneous. The one case of pemphigus gave a negative Wassermann. One case of *Retinal Detachment* at nine years with two blind brothers and a near-sighted sister gave a negative. One "congenital amaurosis" with keratoconus and ulcers declined. One "prenatal corneal scarring" with blue sclera gave a negative Wassermann. One man 44 years old with detachment of retinæ (with choroidal exudates, very high blood-pressure, albumin and hyaline casts) was reported positive a year ago; is now negative.

We thus have had from 112 Wassermanns, 96 negatives, and 11 positives besides five cases of undoubted syphilis

Disease.	*Total Cases.*	*Declined Test.*	*Neg.*	*Pos.*
Ophthalmia Neonatorum	35	5	29	1
Corneal Ulceration	7	1	6	0
Parenchymatous Keratitis	1			1
Trachoma	5	2	3	0
Malformations	21	5	14	2
Simple Trauma	4		4	
Sympathetic Ophthalmia	10	4	6	
Cataract	15	3	12	
Progressive Uveitis	7		6	1
Retinitis Pigmentosa	5	2	3	
Retino-Choroiditis	5			5
Optic Atrophy	17	3	9	5
Pemphigus	1		1	
Retinal Detachment	1		1	
"Congenital Amaurosis with Keratoconus and Ulcers"	1		1	
"Prenatal Corneal Scarring"	1		1	
Albuminuric Exudative Detachment of the Retina	1			1
	137	25	96	16

which had already received treatment and were negative, *i.e.*, sixteen cases of syphilis in 112 pupils. Remembering that the consensus of opinion of syphilographers is that 10% to 15% of the population have syphilis, and that at least 90% of hereditary syphilitic children give a blood-positive of which probably less than one half are made negative by treatment, we feel that our results have been accurate; and we believe that some interesting statistics along other lines could be compiled if those in charge of schools for the blind would co-operate by publishing as far as possible all cases of interest.

REPORT OF A CASE OF EMBOLISM OF THE CENTRAL RETINAL ARTERY IN CHOREA.

By Dr. ARNOLD KNAPP, New York.

R. K., aged 8, was seen July 6, 1917, stating that a month ago she had suffered from an attack of mumps, that condition being endemic in her neighborhood. The attack affected only one side of the neck, causing a swelling in the usual region without any febrile disturbance or malaise. One week later she developed typical choreic symptoms, consisting in a loss of control of the left hand and of the right foot, with twitching of the muscles of the face. On the following day the sight in the left eye was lost. About four days ago the skin of the lids of the left eye became black and blue for about twenty-five minutes and then this discoloration disappeared. She gives a history of repeated attacks of tonsillitis for several years and of mild joint pains for the past seven months.

The pupil of the left eye is dilated and does not react to light. No p. l. The optic nerve is white with a blurred temporal margin. The vessels are normal with the exception of the inferior temporal artery which is very thin. Pressure on the eyeball causes distinct arterial pulsation. The region at the posterior pole of the eye shows a haze of the retina which is particularly marked at the macula, this region appearing red (cherry spot) and presenting a number of bright spots and slight choroidal changes. The right eye is normal.

Dr. W. W. Herrick found, on physical examination, that the right tonsil was buried, the left apparently normal, large superficial lymph glands in the neck, with slight thyroid prominence. The heart is slightly enlarged to the right and in the pulmonary conus region. The first sound is short and abrupt and after exertion is prolonged into an extremely faint, short systolic blow. The second pulmonic sound is very loud. The rate is 100 and there is extreme sinus irregularity. From these signs he can not say definitely that there

is endocarditis. However, the enlargement to the right and in the conus region and the character of the first sound at the apex and of the second pulmonic are suggestive.

The case seems to be a comparatively straight one of an infectious parotitis followed by chorea minor and embolism of the central retinal artery. The examination of the heart revealed no anomaly and there have been no signs of articular rheumatism; the source of the embolism is an endocarditis of rheumatic origin, which is not sufficiently developed to give marked physical signs.

The association of chorea and embolism of the retinal artery has occurred in a number of instances, and Leber[1] contributes a chapter on this association. It seems clear that there is a closer relationship between embolism and chorea, for up to the present time Leber has collected nine cases exhibiting this association. The cases always occurred in youthful individuals between seven and twenty-six years of age. In three cases there was a pronounced cardiac lesion, and in two the cardiac symptoms were slight. In two cases articular rheumatism had preceded the eye disturbance. In some of the cases transient attacks of obscuration and blindness preceded the attack of permanent blindness and in one case published by Nettleship the attack of obscuration had also affected the other eye.

Leber, in the first edition of the *Handbuch*, was the first to draw attention to the probable association of embolism and chorea based upon the report of two cases. The additional cases which have since been observed substantiate the embolic theory of chorea. The close connection between chorea and acute articular rheumatism and endocarditis is founded on both clinical and pathological evidence. The pathological condition however is not clear. In some cases multiple emboli of the small cerebral vessels have been assumed and the corpus striatum and the thalamus opticus have been regarded as the areas affected. At the same time chorea may have other causes than cerebral emboli. The frequency of the combination of chorea with diseases which cause embolic disturbances is an

[1] Leber, *Graefe-Saemisch-Hess Handbuch*, vol. vii., pt. 1, p. 271, 1916.

acknowledged fact. This is furthermore substantiated by the cases of sudden blindness in chorea which are presumably of embolic origin.

Oppenheim,[1] in discussing the various forms of chorea, speaks of the frequent association of chorea, articular rheumatism and endocarditis, and it is a striking clinical fact that chorea frequently follows acute articular rheumatism in which cases presumably the endocarditis is an intermediary. Occasionally the endocarditis is not observed until after the onset of the chorea, and the articular rheumatism also develops late. Articular rheumatism, however, has caused chorea without any evidences of endocarditis.

Some authors regard chorea as always of infectious origin, and a number of bacteria have been found on culture in these cases. Sachs[2] describes several cases of septic chorea with the presence of staphylococci and streptococci; finally, chorea has been occasionally found to follow certain infectious diseases, like scarlet fever, measles, and influenza.

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[1] Oppenheim, *Lehrbuch*, p. 1706, 6th edit., 1914.

[2] Sachs, *Medical Record*, 1908.

HISTOLOGICAL FINDINGS IN EYEBALLS LOST THROUGH COMPLICATIONS FOLLOWING SCLERO-CORNEAL TREPHINING.[1]

By Dr. W. GORDON M. BYERS, Montreal.

(*With two illustrations on Text-Plate XVI.*)

THE following cases are of interest as showing the pathological changes in complications that apparently must inevitably occur at times after sclero-corneal trephining; and are instructive in that they bring out certain points in regard to the technique of Elliot's operation.

Case 1.—A woman, aged 31. Failure of sight in the left eye noted for several months; no other subjective symptoms. Pupil, oval in the horizontal meridian, fixed. Practically complete cupping of the optic disk, with marked pallor. V. = hand movements; a field (practically circular) of about 5° remains at the fixation point. T. = 34 Hgmm. O. D., fundus normal; F. of V. normal; V. = 90° + 0.75 + 0.25 $\frac{a}{a}$. T. = 15 Hgmm.

A sclerocorneal trephining was performed on March 2, 1915, with a complete iridectomy, easily achieved; no complications. The woman returned only on December 12, 1915, pregnancy and the birth of a child having made it impossible for her to come to the city at an earlier date. The eye had become suddenly painful shortly after leaving the hospital in March.

Examination: Eye unbearably painful and markedly congested; bleb collapsed, the broken conjunctival covering being mixed with prolapsed uveal tissue; no a. c. In the area of the coloboma upwards, occupying about a third of the space, is a small, tongue-shaped patch of corneal infiltration with its base resting on the limbus. Enucleation.

[1] Read at the meeting of the American Ophthalmological Society, New London, July, 1918.

ILLUSTRATING DR. BYERS'S ARTICLE ON "HISTOLOGICAL FINDINGS IN EYEBALLS LOST THROUGH COMPLICATIONS FOLLOWING SCLEROCORNEAL TREPHINING."

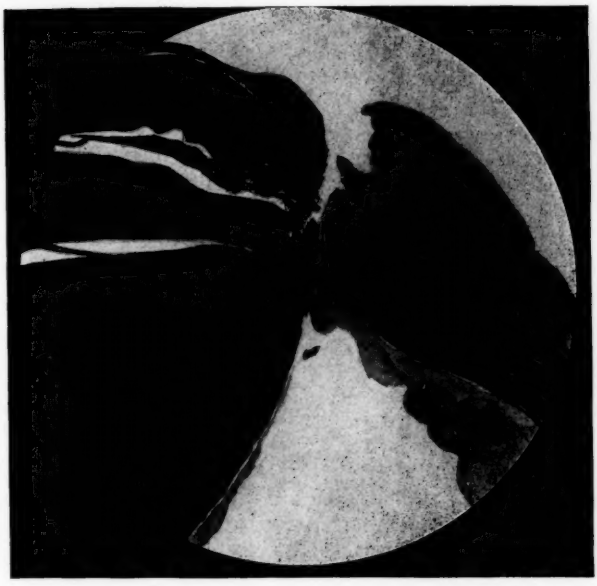

FIG. 1.—Section through trephine aperture showing changes which are, in an exaggerated way, those that are characteristic of healing corneal wounds, with a marked response to injury or infection on the part of the uveal tract. The dislocated lens lies against the posterior opening of the wound, and its capsule is ruptured.

FIG. 2.—An ectatic scar covers dome-like the site of the trephine opening. It is lined for the most part by atrophied ciliary body, and its concavity is occupied by vitreous prolapse. The zonular fibers are ruptured, and the lens is displaced.

Microscopically one sees (Fig. 1) an open, apparently filtering wound. There are marked thickening, œdematous imbibition, and round-cell infiltration of the episcleral tissue. Toward the scleral side, the ruptured and thickened conjunctiva overhangs a very loose fibrillar reticulum. On the corneal side, large masses of granulation tissue are seen extending inwards, and especially downwards, from the thickened and bifurcated epithelial layer.

Behind, masses of pigmented cells are streaming forward into the wound around the promontory of the protruding sclera. On the corneal side, an enormous number of proliferated endothelial cells, with granulation tissue, are seen extending along Descemet's membrane in the immediate vicinity of the wound, and extending forward along the cut end of the cornea to plug the aperture.

The posterior opening of the wound is filled by the dislocated lens, save for a narrow channel on either side between the surface of this structure and the sclera and cornea respectively. The lens capsule is ruptured, and large numbers of reparative cells (epithelial as well as endothelial) are seen filling the gap, and infiltrating cleavages between the lens fibers.

Elsewhere one sees a well-marked plastic inflammation of the whole of the uveal tract with the usual changes. The cornea is markedly crinkled on its posterior surface towards its periphery.

The changes in this case are, in an exaggerated way, those that are characteristic of healing corneal wounds, with a marked response to injury or infection on the part of the uveal tract. In contrast to the second case, the dislocation of the lens and the tearing of its capsule in this specimen are attributable to the sudden reduction of intraocular tension following collapse of the bleb.

Case 2.—A remarkably alert and well-preserved lady of 83. Gradual failure of vision for a few years, attributed to dense nuclear opacities of the lenses. These made a clear view of the fundi impossible. O. D., V. = fingers at 3 ft.; small field of vision only about the fixation point. T. = 40 Hgmm. O. S., V. = fingers at 20 ft.; F. of V. complete. T. = 23 Hgmm.

Sclero-corneal trephining, November 14, 1915; no complications, but slight difficulty in performing a partial iridectomy. The patient was perfectly comfortable until the morning of the eighth day, when three short, separate periods, in which flashes of light were seen, ushered in com-

plete loss of sight. Following this the eye became more and more irritable and painful, with greatly heightened tension, necessitating enucleation, January 22, 1916.

One sees in this case an ectatic scar covering domelike the site of the trephine opening. In all sections except the one here depicted, it is of almost uniform thickness, and composed of newly-formed fibrous connective tissue (still largely cellular) derived in part from the sclera, the cornea, and the uveal tract respectively. It is lined for the most part by the atrophied ciliary body; and its concavity is almost entirely occupied by a vitreous prolapse.

In the section illustrated a narrow, patent channel, immediately behind the cut surface of the cornea, leads from the posterior chamber to a dilated space directly beneath the conjunctiva. The epithelial covering of the latter is greatly attenuated, but the rupture seen occurred during the enucleation of the globe. In this specimen iris tissue is visible along the posterior surface of the cornea; but other slides show that a portion of the iris was actually removed, notwithstanding that elsewhere it is seen greatly atrophied and intimately adherent to the posterior surface of the cornea for a considerable part of its outer continuity.

The lens is displaced downwards; the zonular fibers are ruptured; and the vitreous prolapse here also blocks the filtering channel.

The point of interest in this case is the vitreous prolapse, and a brief study of the specimen shows clearly what must have been the course of events leading to its occurrence. The trephining in the first instance was too peripheral, though the operation was performed after considerable experience with the procedure, and it seemed quite satisfactory at the time. During the first few days the uveal tract was sufficiently strong to support the intraocular structures; but it gradually stretched under pressure, and finally gave way on the eighth day, with consequent rupture of the zonular fibers and hyaloid membrane, dislocation of the lens, and renewed tension following vitreous prolapse. At the time of the occurrence of the flashes of light the feeling was, that they were probably attributable to retinal hemorrhages; but there are no extravasations of blood to be seen in any part of the specimen.

The lesson here is obvious. Especially in these advanced cases in which accidents of this sort are prone to occur, Colonel Elliot's advice in regard to placing the trephine opening in corneal tissue should be followed to the fullest extent. Only in this way can one guard as far as possible against the occurrence of the changes described; while on the other hand the procedure offers the best chance of securing unadherent iris for excision.

I am indebted to Dr. Gross for the preparation of the illustrations.

SPASM OF ACCOMMODATION[1]

By Dr. JAMES W. WHITE, New York.

THE accompanying case of spasm of accommodation is reported because of the infrequency of the condition and of some unusual elements in this case.

The etiological factors of spasm of accommodation are more or less agreed upon by various observers. Koenigshoefer classifies them under the following heads. (*a*) Those of central origin, functional neuroses, general intoxications, etc. (*b*) Reflex spasms, neuralgia of the fifth nerve, muscle anomalies, affections of the lids and conjunctiva, sinusitis, etc. (*c*) Traumatic spasm (rarely direct trauma to the ciliary body but usually reflex). (*d*) Occupation spasms. The classification of Mauthner is essentially the same as that of Koenigshoefer.

The condition is most frequently met in hysteria and is more frequently seen in myopia than in hypermetropia or emmetropia. The cases reported as coming on after sudden fright (Venneman) and accompanying dysmenorrhœa (Mooren) are of group (*a*) in the classification. Donders saw no cases of spasm of accommodation in 2000 consecutive cases of myopia. Koenigshoefer saw four cases in 34,000 cases of myopia and reported eight cases in all irrespective of refractive error. Graefe reported a case in 1854 without refractive error that required − 13 D lens for distance, and Liebreich reported the case of a young woman twenty-one years old who accepted − 13 D for distance but who could see clearly only at a distance of six inches. Under atropine her refraction was + 0.25 Sp.

[1] Presented at the meeting of the Section on Ophthalmology, New York Academy of Medicine, February, 1918.

Spasm of accommodation is occasionally produced by the local instillation of eserine.

Spasm of accommodation like paralysis of accommodation is usually of cortical or nuclear origin. If cortical it will affect both eyes simultaneously. If nuclear it may affect one eye or both according as one or both nuclei were involved. Spasm of accommodation due to trauma may be unilateral if the trauma is such as to cause direct or reflex irritation of one ciliary muscle.

Several reported cases of spasm of accommodation are, as pointed out by Koenigshoefer, not true spasm of accommodation but are an unusually powerful accommodation within normal limits. The term "spasm of accommodation" is often improperly applied to cases that respond slowly to a cycloplegic or to those who on a post-cycloplegic test accept a much weaker lens than when under the cycloplegic. Yet it seems difficult to distinguish these from spasm. A man who persistently accepts an overcorrecting concave lens is certainly exhibiting a spasm of accommodation.

CASE REPORT.—Miss E. L., age 27. Nine years ago began to have poor distant vision and diplopia. She was examined by an ophthalmologist who said she required − 3.50 D lens. He refused to prescribe this but used atropine instead. Thirteen months later he found − 9. D necessary but again advised against the use of glasses. Soon after this she was seen by another ophthalmologist who prescribed − 6.50 D lenses. Two and a half years later this was raised to − 8 D and sixteen months later to − 9.00 when 10$^{\Delta}$ base out R. and L. was combined with this. This was worn constantly until June, 1917. At this time her vision was R. and L. $\frac{8}{200}$ without glasses corrected to $\frac{20}{20}$ R. and L. with − 9. D. With this she read J. #1 at 10 inches and without glasses J. #1 at 6 inches. There was an alternating esotropia of 46$^{\Delta}$ for distance and 50$^{\Delta}$ for near and an homonomous diplopia of the same amount. Associated movements showed an insufficiency of both externi and of associated movements upward. The pupils were moderately dilated but reacted normally to light and convergence. Atropine was prescribed for refraction. Three days later under atropine the following was found: V. R. and L. $\frac{20}{40}$ + without glasses. Skiascopy R. + 0.25 + 0.25^{c} 90°, L. + 0.25 Sp. She now had an esophoria of 1$^{\Delta}$ for distance and 8$^{\Delta}$ for near. There was no diplopia at any

distance. External recti and associated movements were normal. No glass was prescribed but atropine was continued for one week when it had to be discontinued on account of systemic poisoning. While under the cycloplegic + 2.50 lenses are necessary for near vision. Frequent attempts have been made since to use atropine or scopolamine but neither can be used for more than a week or two. The condition has remained essentially the same for the past year. The amount of esophoria or esotropia varies from time to time depending on the degree of cycloplegia and returns to the original amount when the cycloplegic is discontinued.

Complete neurological examinations have been made at the Neurological Institute and at the neurological department of Vanderbilt Clinic without determining the cause.

Treatment thus far has been the continued use of cycloplegics with diverging exercises. When not under cycloplegic a reduction in the strength of the glasses and discontinuing the use of prisms. Thus far the condition has remained stationary.

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REPORT OF SEVERAL PATHOLOGICAL PUPILLARY CASES, WITH ESPECIAL REFERENCE TO WHAT CONSTITUTES A TRUE ARGYLL-ROBERTSON PUPIL.

By Dr. JOHN DUNN, Richmond, Va.

THE objects in the report of the following cases, interesting as they are in themselves, are (1) to further accentuate the fact that the *primary pupillary response to light is an autonomic reflex* and as such belongs to the vegetative system, and, *further, is mediated through the ciliary ganglion;* (2) to call attention to what constitutes the true Argyll-Robertson phenomenon, and (3) to explain how and why the array of symptoms constituting the uncomplicated Argyll-Robertson syndrome vary from case to case and in the same case at different stages of its history.

In the May number of the Archives of Ophthalmology appear two papers, one on "The Eye in Nervous Diseases" by Dr. W. A. Holden; the other on "The Light Pupillary Reflex, Its Path and Abolition," by Dr. Anton Lutz. Both papers overlook the possibility of there being such a thing as a pupillary response to light which is not aroused by impressions which have traveled from the retina along the optic nerve to the photomotoricus nucleus of the third nerve and thence outwards.

The ciliary ganglion finds no place in the diagram of the visual pathway as given by Dr. W. A. Holden (p. 233). Dr. Lutz devotes several paragraphs to the importance of the ciliary ganglion but apparently sees in it only a transmitter, so far as constriction of the pupil is concerned, of impulses which have come from the third nerve centers. Nowhere have I been able to find answers to the simplest questions about the

raison d'être of the ciliary ganglion, and until these answers have been correctly given the existing confusion in regard to the primary pupillary reflex must continue. Why do the motor fibers to the pupil and ciliary muscle pass through a ganglionic mass in the orbit (the ciliary ganglion) and not go direct, as do the motor fibers, to the external ocular muscles? For what purpose do the sensory and sympathic fibers enter this same ganglion? Why do the long ciliary nerves not find a ganglionic connection within the orbit necessary?

Heretofore all efforts to explain the primary pupillary response to light have started with the effect of light on the retina and following the retinal fibers centralwards have tried to make connections which would explain the primary, consensual, and accommodative reflexes. The result has been, as Bumke confesses, that "the exact determination of the pupillary reflex tract is not only the next but the most important thing to be determined." Let us leave out of consideration for the moment the optic nerve path. Let us confine our attention to the sensory and motor terminal fibers from and to the ciliary ganglion. The short ciliary nerves consisting of sensory, motor, and sympathetic fibers emerge from the ciliary ganglion and are distributed to the cilio-iritic region. Sensations picked up by the sensory elements of the short ciliary nerves are carried backwards to the ciliary ganglion. Why to the ganglion? This is the crux of the whole question. The ganglion is not a purposeless mass of nervous tissue. It has a definite function. What is it? Why is it that the motor fibers, the sensory fibers, and the sympathetic fibers that enter it do not pass with their forms unaltered through the ganglion? Why do all three sets of fibers make connections with each other within the ganglion? There can be but one answer—and that is that it is to make possible the existence of primary reflexes; in the case of the ciliary ganglion, these reflexes are manifested in movements of the pupil and ciliary body and in changes in the activities of the ciliary gland. Primary reflexes are brought about wherever there exist extracerebral ganglia. The jerk of the foot when the patellar is struck is a reflex response, and to explain it we do not say the nervous pathway is sensory nerves to the spinal cord, along the sensory spinal nerves to the cerebral cortex where communi-

cation is made with the motor cells and thence through the internal capsule to the spinal cord and along the motor tract outwards to the leg muscles. We are satisfied to say that the knee jerk is mediated through the appropriate spinal ganglia. Admission of this in no way lessens our understanding of the willed and coördinated movements of the foot and leg. This reflex belongs to the domain of the voluntary muscles. The primary pupillary response belongs to the domain of the autonomic system. Or, look at the question another way, the sensory elements of the short ciliary nerves convey sensory impressions born in the iridociliary region to the ciliary ganglion. These impressions must serve a physiological purpose within the ganglion, otherwise the ganglion would be unnecessary. The finer ganglionic anatomy is such as to render it certain that these sensory impressions are transmitted to both the ciliary and iritic motor fibers within the ganglia. Then what happens? Motor fibers do not transmit impulses centralwards. *The impulses then must be transmitted peripheralwards and can have but one effect, contraction of the sphincter pupillæ and of the ciliary muscle.* The sensory impulses from the iridic and ciliary region, which on reaching the ciliary ganglion are therein communicated to the sympathetic element, are transmitted also peripheralwards and result in a response as the part of both the activities of the ciliary glands and of the dilatator pupillæ. If these statements are not so, what is the purpose of the ciliary ganglion? I can conceive of no reason why the motor fibers to the iris and ciliary muscle should be interrupted by a peripheral ganglion other than that thereby is rendered possible the production of primary reflexes, *i.e.* those reflexes that are produced without recourse to the higher nervous centers. The long and short ciliary nerves are distributed to the ciliary and iritic regions. No sensory nerves have been demonstrated as going from the retina. With an intact iris and ciliary body, if the retina be entirely atrophied, it is impossible to produce the primary light reflex. This proves beyond question that an active retina is a *sine qua non* for the production of the primary light reflex. The retina has distributed to it no sensory nerve terminals from the ciliary ganglia. We might, at first thought, then exclude the possibility of the ciliary ganglion mediating the primary light reflex as claimed above. When,

however, light falls on the retinal ganglion cells, great activity is aroused in the adjacent pigment cell layer. This layer is continuous to and through the ciliary and iritic regions, and it is through disturbance of this pigment layer that the sensory nerves of this latter region are stimulated for the originating of the primary light reflex. The motor cells to the ciliary muscle also pass through the ciliary ganglion. This has also for its purpose the making possible of a primary ciliary muscle reflex. This is also possibly secondary to the impact of light in the retina, just as is the primary pupillary reflex, and has for its object a reflex contraction of the ciliary muscle occurring at the same time with that of the contraction of the pupil. It is more likely, however, that the primary ciliary reflex is secondary to the iritic movements of the primary light reflex. These movements create sensory impressions which are transmitted to the short ciliary nerves, thence outwards along the ciliary motor fibers from the ciliary ganglion to the ciliary muscle. *This is also an autonomic reflex and is entirely distinct from the accommodation act.* As the primary pupillary reflex is probably protective in its origin, so too is this primary ciliary reflex. *This primary ciliary reflex is not possible when there is complete atrophy of the retinal cells, and yet under the same conditions both contraction of the ciliary muscle and its consensual pupillary response are at times possible* (*vid.* Case No. 1). Why do the long ciliary nerves not pass through the ciliary ganglion? Because their impulses do not take part in the production of a primary reflex. When the ciliary muscle begins to contract, and thus is put in motion the crystalline lens system, a set of sensations is aroused different from those aroused by the impact of light on the retina. It is these sensations that are taken note of by the long ciliary nerve terminals and carried centralwards to inform the brain of the degree of contraction of the ciliary muscle, information which assists in regulation of the accommodative action of the crystalline lens *and in accompanying changes in the size of the pupils.* This is the origin and explanation of the movement of the pupil in accommodation.

In considering the anatomy of the ciliary ganglion in the light of the claim made that for the production of the A.-R. pupil the syphilitic organism selects for its action the sensori-motor and the sensori-sympathetic connections within the

ganglion, it may justly be asked, how is this possible? I am inclined to think the explanation is to be sought in the method of termination of the ultimate arterial supply to the sensory nerve terminals. It is probable that we have supplied to each element of the ganglia end-arteries, just as occur in the retina.

It must be borne in mind that what we have written here bears directly only upon the primary pupillary response to light. The paths for the consensual light reflex and the accommodative pupillary response are different and much more elaborate, requiring the aid of the third nerve nuclei and higher centers for their accomplishment and regulation.

The first case to be here reported is one of the *Pseudo-Argyll-Robertson Pupil.*

That in a given case the pupils do not respond to light either directly or consensually and do respond in convergence does not necessarily make the case one of the Argyll-Robertson pupil. The true Argyll-Robertson pupil, free from complications and before degenerative changes affecting either the retina or the motor fibers in the ciliary ganglia set in, gives the above syndrome *plus the fact that the pupils are contracted.* Elsewhere I have tried to show that the lesion causing this picture can be situated nowhere else save in the ciliary ganglia and can be caused only by microörganisms or their products which shut off therein the sensori-motor and sensori-sympathetic connections. So far syphilis is the only proven cause. Where a lesion of this character exists the sensory nerve impulses from the ciliary and iritic regions to the ciliary ganglia do not arouse corresponding responses in the motor fibers to the ciliary muscle and to the iris, the result being absence of the primary or autonomic reflexes of both the iris and ciliary muscle. Further, no action on the part of the sympathetic within the ganglion is possible and the only impulses reaching the iris are along the motor fibers passing directly through the ganglion. A contracted pupil is the necessary result.

CASE 1.—James F., negro, aged 50. Examination showed both eyes to be totally blind; both pupils were fully dilated and gave no trace of response to light either directly or consensually. The negro being blind could not converge his eyeballs. When told, however, to try his best to look at the end of his nose, both eyes would turn downward and slightly

inwards. As the result of this effort, both pupils distinctly contracted; dilating when the eyes returned to their usual position. This case is interesting as showing (1) that the crystalline lens system may remain active for a considerable time after an eye has become completely blind following complete retinal atrophy; (2) where the retina is completely atrophied the primary pupillary light reflex is abolished, as is (3) the consensual light reflex, but not (4) necessarily the accommodative consensual pupillary reflex. In this case the patellar reflexes were present and while the neuroretinitis, which caused the total blindness, may have been syphilitic in origin, I could find no other confirmatory symptoms. The convergent accommodative pupil response, when the experiment mentioned above was made, was well marked. In my experience the retention of the accommodative pupillary response in totally blind eyes cannot be demonstrated, save in rare instances of which this case is one. The reasons are not difficult to understand. The retention in this case makes the case worthy of report.

This case shows one type of the pseudo-Argyll-Robertson pupil. W. A. Holden (*loc. cit.*) says that "non-luetic tumors in the region of the third ventricle by pressure have produced typical Argyll-Robertson pupils." I have never had the opportunity of examining the pupils in a case of a tumor thus situated, and it is impossible for me to understand how such a tumor can produce a typical Argyll-Robertson pupil. Every fact of the history of the growth of brain tumors and every fact of the history of the Argyll-Robertson pupil pleads against such a possibility. The typical A.-R. picture may show for years contracted pupils, normal vision, and no associated paralysis of any external ocular or other muscle. A "non-luetic tumor in the region of the third ventricle" has no such chapter in its ocular history. Such tumors may produce bilateral pupillary disturbances but at no period of their history do these disturbances correspond in all details to the typical Argyll-Robertson pupils. It is impossible that such should be the case. Bilateral disturbance of the "association fibers" between the "external geniculate body, the anterior quadrigeminal body, and the optic thalamus" and "the nuclei of the third nerves causes reflex iridoplegia (A.-R. pupil)" (W. A. Holden, *loc. cit.*). If the light impulses which are carried centralwards by the optic fibers are prevented from reaching

the third nerve nuclei, why should the pupils be contracted (at times almost to a pin point), as they are in a case of uncomplicated A.-R. pupil? The pupils do not contract when both optic nerves have been cut. They do not contract when both optic tracts have been cut. Why should they contract when these same stimuli sent into the central optic centers have been "disturbed" on their way to the third nerve nuclei? The fact is they do not. If the lesions are of such a character as to cut off the transmission of the optic nerve impulses to the third nerve nuclei, then dilatation of the pupils will result. That the belief that a lesion situated in the region of the third nerve nuclei can produce a typical, true A.-R. pupil is so general in ophthalmological neurology is due to misunderstanding of what constitutes a true A.-R. pupil. There are other reasons why "bilateral syphilitic lesions in the region of the external geniculate bodies, the anterior quadrigeminal bodies, and the optic thalamus" cannot produce uncomplicated typical Argyll-Robertson pupils.

CASE 2.—Illustrating how injury to the third nerve may cause paresis of the constrictor pupillæ as its only demonstrable result.

John B., aged 9, three weeks prior to consultation was pulled backwards from his chair, striking the back of his head against the floor. For a short while he was stunned and finally vomited. Nothing else was observed except that when his father, who is a physician, examined his eyes he found that the right pupil was dilated. This condition, persisting for three weeks, the boy was brought to me. Examination of the right eye showed a normal fundus; normal accommodation; no demonstrable external muscular unbalance; field of vision normal; normal vision. The right pupil was semi-dilated, but responded to light directly, consensually and in accommodation. The left eye was normal. The boy whose intelligence was of a high order, stated that he felt no inconvenience as the result of the blow, *except that he seemed to have some difficulty in judging distances.* In this case, I think the right third nerve was stretched against the edge of the dura where it enters the outer wall of the cavernous sinus, when the brain was thrown forward. The stretching of the nerve resulted in injury to the pupillary fibers sufficient to result in a partial dilatation of the pupil but insufficient to produce a complete paralysis or to prevent the pupillary responses. The "difficulty in

judging distances" is to be attributed to a similar injury to the other third nerve fibers, an injury insufficient to produce diplopia but sufficient to prevent the quick, exact and equal responses of the external muscles of the two eyes. This unilateral isolated paresis is, I believe, not uncommon as the result of injuries to third nerve trunk from injury similar to the one described above, but also, from pressure upon the nerve due to growths and syphilitic deposits at the base of the skull. In especial should this latter be borne in mind when we are endeavoring to determine the nature of the pupillary inequality in any given case of the Argyll-Robertson pupil. This has been commented upon elsewhere and will be returned to later on in this paper. A similar paretic condition of the sphincter may be brought about by a blow on the eyeball.

CASE 3.—A case of unilateral dilatation of the pupil accompanied by reactions, *the reverse of the Argyll-Robertson Pupil.*

Mr. A. L., aged 25. Examination of the right eye revealed the following: paresis of the levator palpebræ, internal rectus, superior rectus, inferior obliquus and inferior rectus. The paresis being greater in superior rectus and inferior obliquus than in the other muscles; less in the internal rectus than in the superior rectus and inferior obliquus. There was complete paralysis of the accommodation, and had we examined the eye without the aid of a strong magnifying lens we would have said that there was complete paralysis of the constrictor pupillæ. The pupil, however, was only semi-dilated. The fundus was normal. The vision was normal. Field of vision was normal. The left eye was normal. The patient had "suffered with" his "head" ever since he could remember. At the age of eighteen he had consulted an oculist, who, as far as I could learn from the patient had found present this incomplete paralysis of the third nerve. At all events, for at least seven years the patient had been conscious of double vision, which is instantly made worse by any effort to look at an object above an angle of about 45 degrees. The cause of his consultation was to seek relief from the periodic severe headaches which seemed to center in and about the right eye. These headaches were worse the greater the interval between them. As to a cause of the paresis, there was only an indefinite history of a severe blow across the upper part of his nose when he was two years of age. On casual examination one would have said all three of the right sided pupillary reflexes were absent. When, however, the pupil was examined under a magnifying glass, there were to be seen distinct responses to light, directly and consensually. These re-

sponses were weak, but unmistakable, the entire circumference of the pupil responding. On the other hand no response could be made out in accommodation; in other words, when a finger held before the nose was gradually approached toward the eye the left pupil would contract, but, although the paretic right internal rectus would turn the eyeball partly inwards, there was no visible response on the part of the right pupil. The interest of this case for us here lies in the pupil. The dilatation is not complete. This tells of a lesion posterior to the ciliary ganglion. There is present the primary light reflex; this shows that the retina, the pigment layer, and the sensory nerves from the ciliary region to the ciliary ganglia are still intact. It shows that the communication within the ganglion between these sensory nerves and the motor efferent fibers to the pupil are still intact. That the pupil contracted shows that responses from the third nerve center still reach the ciliary ganglion; that the response is a feeble one indicates that the amount of the impulse from the third nerve reaching the ganglion along the pupillary fibers is subnormal; *i.e.* that there is partial "paralysis" of these fibers. That the consensual reflex should exist, but be also feeble is also readily understood; but *there is no pupillary response in accommodation.* This is due to complete paralysis of the accommodation posterior to the ciliary ganglion.

CASE 4.—*A case of a type often reported as one of Argyll-Robertson Pupil.*

In reading cases reported, especially by the neurologists, one not infrequently finds among the symptoms the following "Argyll-Robertson Pupil Optic Atrophy," without further ocular details. The case to be reported here is instructive. James B., aged 34. Cause of consultation inability to read. General examination shows loss of patellar reflexes. Both pupils are semi-dilated; about equal in size; both are slightly oval in shape; *apparently* there is no response either directly or consensually to the light; patient can converge well, *apparently* also there is abolition of the accommodative reflex. Why I say apparently will in a moment be understood. Vision O. D. Light perception. O. S. $18/50\gtrless$. The field, O. D., is more or less concentrically reduced to a very small area, somewhere near the macula. The exact limits of this area cannot be defined, because of the poor vision. (The test was made in a dark room with a candle.) The left eye is blind for almost all of the upper half of the field and part of the lower. Both optic nerves show a high degree of atrophy, with contraction and unevenness of outline of both arteries and veins. Patient is unable to read even with glasses. When the pupils are

examined in the usual way no movement can be seen. The case, however, is not one of the Argyll-Robertson Pupil. If, under a strong magnifying glass, the pupil be carefully studied for a while there can be made out a faint hippus and from time to time feeble responses to light both primarily and consensually and in accommodation. These responses are, however, not constantly present and care and patience are necessary to demonstrate them. Their presence, however, is beyond question. The lesion in this case is not in the ciliary ganglia, even though the patellar reflexes are absent. We are dealing with the late stages of a case of syphilitic optic atrophy, in which although most of the retinal ganglia have disappeared some few still remain, and the blood supply to the remaining few is very poor, as is shown by the condition of the veins and arteries. With the disappearance of the retinal ganglia there is a disappearance of the activity of their appropriate pigment cells. Thus it has come about that the sensory stimuli to the ciliary ganglia are very feeble. Both sets of stimuli, however, still exist, but they are both too feeble to produce more than the extremely faint responses. The field of vision asks several questions about the extent of the lesion whose answers are out of place here.

CASE 5.—*A case of uncomplicated Argyll-Robertson Pupil.* Mr. L., aged 54, initial lesion twenty odd years ago. Absent patellar reflexes. Vision, both eyes, normal. *No disturbance of the secondary act of accommodation.* Both pupils are as contracted as though he were suffering from opium poisoning. Entire absence of primary and consensual light reflexes. Retention of accommodative convergence reflex. (To see this, however, the eyes have to be viewed under a magnifying lens.) Fundi normal. Media normal. Fields of vision normal. Above is written no disturbance of secondary act of accommodation. In all cases of true Argyll-Robertson pupil, the primary reflex response of the ciliary muscle is abolished just as is primary pupillary reflex. Just as the primary response to light is not a part of the act of conscious vision but is protective in its character, so the primary ciliary reflex is not a part of the accommodative act but is also protective in its character, inasmuch as has to do with regulating the outflow of the aqueous as disturbed by the primary pupillary reflex. This primary ciliary muscle reflex is abolished because the sensory fibers of the short ciliary nerves from the ciliary muscle to the ciliary ganglia cannot deliver their impulses because of the specific disturbance in the sensori-motor ganglionic connections as explained above when writing of the primary pupillary reflex. In this case the accommoda-

tive action of the ciliary muscle is not interfered with. The sensory link for the regulation of this action is furnished by the long ciliary nerves whose entire tract is uninterfered with.

CASE 6.—*Argyll-Robertson Pupil complicated with unilateral disturbance of the third nerve fibers.*

Mr. A., aged 38, initial lesion at age of 20. Absent patellar reflexes; severe gastric crises; epileptiform attacks of unconsciousness, etc. O. D. Paralysis of all the muscles, external and internal, including the levator, supplied by the third nerve. Pupil semi-dilated. Loss of all pupillary reflexes. Loss of all accommodative reflexes. External rectus and superior obliquus intact. Vision normal. Field of vision normal. Fundus normal. O. S. Pupil contracted. Entire absence of primary and consensual pupillary reflexes to light. Retention of convergence accommodative reflex. Accommodation normal. Vision normal. Field normal.

This is a case of paralysis of the right third nerve, occurring along with the Argyll-Robertson pupil. The dilatation of the right pupil is caused by the paralysis of the third nerve. That there is not dilatation *ad maximum* shows that we are dealing with a disturbance of the third nerve posterior to the ciliary ganglion. It is not nuclear. The ciliary muscle being completely paralyzed and the act of convergence rendered impossible for the right eye all of the accommodative reflexes are abolished. The left eye shows a typical A.-R. pupil. This case is reported because it illustrates one of the causes of the unequal pupils of the A.-R. type. The normal A.-R. pupil picture can be further disturbed by lesions of the nuclei of origin of the third nerve; by lesions affecting the external rectus, or the superior obliquus, unilaterally or bilaterally, and from various sources. These things should be borne in mind when trying to interpret the deviations from the normal A.-R. pupil.

There is still another chapter in the history of the A.-R. pupil and it produces a well-known picture, although its interpretation has hitherto been at fault. The claim is made by the author that the true A.-R. pupil is the result of a selective lesion within the ciliary ganglia, a lesion limited in its first stages to the sensory terminals of the sensori-motor and sensori-sympathetic ganglion cells. If this be so, what happens when the syphilitic agents transgress their primary limits and

involves the motor elements? In the first place a dilatation of the hitherto contracted pupils takes place, equal or unequal for the two eyes as the process within the ganglia is equally or more advanced in one ganglion than the other. What happens when the syphilitic process has destroyed the motor nervous elements of the ciliary ganglia? Dilatation of both pupils; abolition of the primary pupillary and ciliary reflexes; abolition of the consensual light reflexes; abolition of the accommodative pupil reflexes; degeneration of the short ciliary nerves to the ciliary region and later the degeneration of the pigment layers of the retina, degeneration of the retinal elements and an increasing amblyopia and finally total blindness. This condition is not the same as shown in Case 4.

So far as I know, no careful comparative study of the size of the pupil and its responses in the various stages and types of glaucoma has ever been made. There is one picture of the number, however, that is of especial interest here, inasmuch as it lends its weight to our explanation of the primary pupillary response to light. This picture presents itself in certain cases of glaucoma which slowly progress to blindness before the eye becomes the seat of either great pain or of an acute inflammatory attack. It is characteristic of these cases that the pupil is smaller than normal, of equal size with that of the other eye, and that there is relatively slight lessening of the depth of the anterior chamber. Let us take, for example, the case of Mr. L., aged 70. Right eye, vision normal. Left eye, tension + 1½. Totally blind. Anterior chamber not shallower than that of many old people without glaucoma. Pupil about 1¼*mm* in diameter; is absolutely irresponsive to light; responds actively both consensually and in convergence. At first thought one would say there is nothing unusual about this; that the eye does not respond to light because no light impulses pass along the optic nerve to awaken a response, while the convergence and consensual reflexes keep the two pupils of equal size. Such an answer, however, is probably not the whole truth. In the earlier history of this case there almost certainly existed such a condition as is found in the left eye of Mrs. P., aged 56. Right eye normal. Pupil 1¼*mm*. Left eye, tension + 1½, pupil 1¼*mm*. Total abolition of response to light, with retention of both consensual and con-

vergence reflexes. Vision, however, is distinct perception of light for a portion of the lower part of the field. Here then is an eye which perceives light and in which both the consensual and convergence reflexes are retained and yet the eye shows complete absence of the primary pupillary response to light impulses. Here we have an eye whose optic nerve is capable of transmitting centralwards impulses which awaken consciousness in the sight centers and yet when these impulses reach the sight centers they arouse no corresponding response in a pupil which is capable of normally responding both consensually and in convergence. If this case be correctly observed—and I used much care in its observation—then it seems to prove that the primary pupillary response to light is a reflex which neither originates in nor is controlled by either the mid-brain or the cortical ocular centers. What is the explanation of the abolition here of the primary light reflex? In the cases both of Mr. L. and Mrs. P. the glaucomatous process had lasted over a number of years, during which time the increasing pressure had destroyed not only the retinal ganglion cells but the activity of the retinal pigment cells. The activity of these cells is a *sine qua non* for the production of the primary pupillary response to light—as we have tried to show elsewhere. In considering the cortical brain centers of sight and their connections we must bear in mind that they were not added to the primitive brain for the purpose of responding to light impulses. This was something of which the primitive brain was capable. They were added for the purpose of making possible the interpretation of form and color and of bringing their combinations under the domain of the memory. A more detailed discussion of the disappearance of the primary response of the pupil to light before the disappearance of light perception by the eye is reserved for a later paper.

CAVERNOUS SINUS THROMBOSIS. WITH NOTES OF FIVE CASES.[1]

By Dr. DORLAND SMITH, Bridgeport, Conn.

THROMBOSIS of the cavernous sinus is the rarest of large sinus thromboses, less than three hundred cases having been published since its recognition by Herman Knapp (1) in 1868. MacEwan (2), whose description of the condition is one of the best, reports but four cases which he has himself seen. Occurring so seldom in the practice of any one man, early decisive recognition may easily fail. Since, however, the only possibility of lessening the extremely high mortality of the disease lies in prompt surgical interference, such early decisive diagnosis becomes necessary. A brief review of the salient facts known about cavernous sinus thrombosis is therefore presented, based upon the literature, which for so rare a condition is quite voluminous, upon five cases from the practice of the writer which are here first reported, and upon ten cases published since Langworthy's study in 1915.

NOTES OF FIVE NEW CASES.

Case 1.—S. S., a Polish male of 25, was admitted to the Bridgeport Hospital, April 16, 1915. Previous history negative. Present history: Seven days ago swelling appeared on the bridge of the nose, extending to both eyelids, especially the left; no obvious infection; no history of trauma. Slight nasal discharge for past three days. Complains of chills and headache only. Temperature on admission at 4 P.M. 102.8°. Physical examination shows a well nourished man with marked exophthalmos of the right eye and complete immobility of the globe. Pupil dilated and insensible

[1] Thesis, American Ophthalmological Society, 1918.

to light. Some swelling of the lids and chemosis. Left eye normal. Pain and tenderness over the entire face and slight stiffness of the neck. Physical examination otherwise negative.

April 17. Temp. A.M. 101°; P.M. 105°; restless, complaining of violent headache. Rhinologist reports "Nothing in nasal passages." Slight swelling of left upper lid was noted at 5 P.M.

April 18. Temp. A.M. 103.4°; P.M. 105°. Marked exophthalmos and fixation of left globe all day. Symptoms in right eye receding. Spinal fluid reported by Dr. Peters: "Pressure slightly increased, turbid, 500–600 cells per *cu.mm.*, mostly polymorphs, globulin + +; Fehling present, no organisms." Blood culture shows staph. aureus bacteremia. The patient was semiconscious in the morning, unconscious in the afternoon. 8 P.M. temp. 106°. At 8.55 he died.

April 19. Autopsy of head only permitted. Report by pathologist, Dr. Peters. "There is considerable chemosis of tarsal conjunctiva, especially of left eye, but no exophthalmos. On removal of brain there is found a thin purulent exudate over base. In the cavernous sinus of the right side is found a somewhat purulent bloody substance; no firmly attached thrombus. Ethmoid cells and frontal sinuses normal; mastoids normal. Smears from base of brain and from sinus show numerous Gram-positive cocci, mostly in pairs."

CASE 2.—Mrs. H. G., an American woman of 35, was seen in consultation with Drs. Cogswell and Roller at 1 A.M. August 15, 1915. Previous history: negative except for chronic right ethmoid infection. Present history: chills and high fever for several days, with severe headache and meningeal symptoms; swelling of right eye thirty-six hours ago and of left eye beginning eight hours ago. Delirious for the past six hours. Phys. exam.: Patient unconscious but very restless. Marked exophthalmos of both eyes with swelling of the lids, intense chemosis of the conjunctiva, and complete immobility of both globes. Pupils dilated and insensible to light. Fundi show considerable congestion and dilatation of veins. Temp. 106°. One hour later she died. No autopsy permitted.

CASE 3.—W. H. L., an American male of 35, was seen in consultation with Dr. D. C. Patterson on October 11, 1915, because of a conjunctivitis accompanying a facial erysipelas which apparently started from a fissure in the right nostril. The conjunctivitis cleared and, owing to absence from the city, the man was not seen again. Upon returning, his physician reported that the erysipelas ran a typical course and was very much improved, when, October 27th, he be-

came much worse; the right eye became proptosed, the pupil dilated, and there was marked chemosis and lid swelling. Three days later exophthalmos of the left eye appeare and there were symptoms of meningitis. October 31st, he died.

CASE 4.—Miss A. W., an American woman of 60, was seen in consultation with Dr. Cogswell, October 4, 1916. Previous history: negative except for an abscess at the root of the left eyetooth which had been under treatment for the past four weeks. Present history: two days ago there was a slight swelling of the left upper lid which slowly increased; aside from this she seemed well until this morning, when her sister thought she was a little flighty in conversation at breakfast, and insisted upon putting her to bed and sending for the doctor. Dr. Cogswell came at noon and found her semiconscious, restless, with a high temperature and with some exophthalmos of both eyes. At 3 P.M., when I first saw her, there were marked exophthalmos of both eyes, chemosis, and complete fixation of both globes, pupils dilated and fixed, retinal veins greatly dilated. She had a high temperature, was unconscious and could not be roused. At 9 P.M. she died. No autopsy permitted.

CASE 5.—T. M., a German of 38, seen in consultation with Dr. Roller, December 4, 1916. Previous history not obtained. Present history: sickness began with a boil on the left side of the nose seven days ago. This was incised and dressed dry. Two days ago he had a chill and high fever and meningeal symptoms appeared. This morning exophthalmos of the left eye was noticed and he became irrational. This afternoon the right eye also was involved. When I first saw him at 9 P.M. there were moderate exophthalmos of both eyes with complete loss of motility; dilated pupils; fundi normal except for congestion; some doughy swelling below and outside the left eye, apparently not connected with the boil on the nose, which was healing; patient unconscious and quiet with deep stertorous breathing. Four hours later he died. No autopsy.

NOTES OF TEN CASES REPORTED SINCE 1915, OR NOT MENTIONED IN PREVIOUS STUDIES.

Wacker's case (18) followed a furuncle inside the nose. Exophthalmos on the third day, meningitis the fifth, death on the seventh day. Autopsy showed staphylococcic thrombophlebitis of both cavernous sinuses and metastatic abscesses in the lungs.

Henning's case (19) was also from a facial infection, as was another case reported in the discussion.

Dayton (20) reports two cases; one from a purulent infection in the nose with death eleven days after eye symptoms appeared; the other in a girl of 15 who had typhoid fever and a probable lighting up of a chronic nasal sinus disease; death in seven days. No autopsies.

Payr (21) diagnosed a sterile thrombus in the cavernous sinus following an infective thrombophlebitis in the upper arm of the opposite side. There was no exophthalmos, but all the nerves in the sinus were involved.

Davis's case (22) followed tonsillitis, with death in ten days. Exophthalmos of one eye only. Spinal fluid normal. He has seen two other such cases after tonsillitis, one recovering with loss of sight, the other dying on the fifth day. Also a case with double exophthalmos following mastoid disease and operation, with death on the fifth day. In the discussion O'Malley reported a case three weeks after tonsil and adenoid removal; autopsy showed osteomyelitis of the sphenoid, probably the primary focus. St. Clair Thompson has seen three cases, two from the sphenoid and one from the ear. J. Horne had seen one sphenoidal case. F. Powell one case secondary to intracranial suppuration.

Sitzen (23) reports two cases; the first followed a boil on the nose with death ten days after the appearance of the boil, three days after exophthalmos involved the second eye. Autopsy showed thrombosis of the cavernous and superior petrosal sinuses and meningitis from staphylococcus infection. The second case followed a facial erysipelas starting in a nasal furuncle. There was exophthalmos of both eyes and pronounced meningeal symptoms. Autopsy showed cavernous sinus thrombosis and meningitis. Knoch reported a third case, also from a boil on the nose, with death on the third day. No autopsy. These three cases occurred in Java.

SURGICAL ANATOMY.

The cavernous sinus, the most important venous channel at the base of the skull, lies between layers of the dura beneath the temporo-sphenoidal lobe. It is roughly quadrilateral in shape, larger behind than in front, *2cm* or more in length and

about 1*cm* in diameter. Evidences of its origin as a venous plexus in the dura remain in the interlacing bands of lining endothelium, which divide it into several irregular compartments. It extends along the side of the sella turcica, separated by a very thin bony wall from the sphenoidal sinus of the nose, from the sphenoidal fissure at the apex of the orbit where it receives the ophthalmic vein, to the apex of the petrous portion of the temporal bone where it opens into the petrosal sinuses, the superior to the lateral sinus, the inferior to the jugular vein. The cavernous sinuses of the two sides are connected by the circular sinus, two transverse vessels one in front of and one behind the pituitary body. On the internal wall of each sinus lie the internal carotid artery and the sixth nerve; on its outer wall from above downward the third, fourth, and the ophthalmic division of the fifth nerves. Each cavernous sinus has emissary veins through the foramina ovale, lacerum medium, and Vesalii to the pterygoid and pharyngeal plexuses, and a plexus of veins around the artery in the carotid canal to the internal jugular vein. It also receives veins from the frontal lobes of the brain and from the middle cerebral vein.

The cavernous sinus is thus in direct venous connection through the lateral sinus with the veins of the ear, through the pterygoid plexus with the veins of the mouth and throat, and through the ophthalmic vein with the veins of the orbit, of the nose, and of the face. The facial vein, on account of its exceptional patency and lack of valves, favors septic absorption and thrombus formation, and the extension of thrombi therefrom to the cavernous sinus is anatomically very easy, either via the angular and ophthalmic veins, or via its tributary from the pterygoid plexus. The orbital veins are also valveless. The inferior ophthalmic, which has a branch through the sphenomaxillary fissure to the pterygoid plexus, joins the superior ophthalmic, which communicates with the angular vein at the root of the nose and receives blood from the ethmoidal veins and the venæ vorticosæ, and empties into the cavernous sinus, together with the central vein of the retina.

ETIOLOGY.

According to MacEwan purulent otitis is the commonest cause of cavernous sinus thrombosis. Next to this are infec-

tive lesions of the orbit and face, *i.e.*, of the area drained by the ophthalmic vein and its branches. Of these, orbital cellulitis, boils and infected wounds on the face, and facial erysipelas are the most common. Other causes are purulent affections of the nose and accessory sinuses, especially the sphenoid and the ethmoids, pharyngeal and tonsillar infection, and abscesses at the roots of the teeth. Thrombosis may occur from trauma in the immediate vicinity of the cavernous sinus, as in head injuries. A non-infective thrombosis of the cavernous sinus has been described by Knapp.

The following table shows the original source of infection in 140 cases.

	Ear	*Orbit and Face*	*Mouth and Throat*	*Nose*	*Other Causes*
Dwight-Germain (4)	43	40	14	9	
Jackson (5)	13	6	2		4
Cases here reported		3	2	4	
Approx. %	40%	35%	13%	9%	3%

The path of infection. Infective meningitis from caries of the body of the sphenoid may extend by contiguity, according to MacEwen (2), directly to the cavernous sinus, as may intracranial suppurative processes. Ordinarily however, there is set up in the veins draining the infective source a thrombophlebitis, from which the thrombic process extends through venous channels to the cavernous sinus. Its usual routes are from the sigmoid through the petrosals from behind, through the ophthalmic veins in front, or from below by way of the pterygoid plexus.

The infecting organism may be any one of the pus-producing group, of which perhaps the staphylococci and streptococci are most frequently found.

SYMPTOMS.

The general symptoms are those of any infective sinus thrombosis, headache, chills, fever with a steep-peaked chart,

quick soft pulse, and euphoria. Occasionally there is vomiting. Leucocytosis is present; blood infection may or may not be found. Spinal fluid changes, if present, are those of a beginning basilar meningitis, which is not uncommon. Pulmonary complications from septic emboli in the lungs are frequent. The later symptoms are those of a rapid profound sepsis, delirium, then coma, preceding death.

The local symptoms are largely eye symptoms, and occur in two groups: I. Those due to intraorbital venous obstruction, and II. Paralyses of the nerves within the sinus, due to pressure and to phlebitis of the sinus wall.

Of the first group the most important as well as one of the earliest symptoms is exophthalmos. This according to most observers is rarely absent; Knapp (6) states that it occurs in 72% of the cases. It appears first in the eye upon the same side as the originating infection, rarely on the opposite side, and increases as the infection advances. The eyeball is pushed forward by the venous engorgement and œdema at the back of the orbit, which also cause swelling and œdema of the lids extending over onto the root of the nose, chemosis of the conjunctiva, and engorgement of the conjunctival veins. This may be well marked within a few hours. If the thrombic process involves the pterygoid plexus, there may be œdema of the pharynx and tonsil, but this is easily overlooked unless the latter was the source of the infection. There may also be œdema of the face from obstruction of the facial vein and of the tissues of the temple and about the ear. All these obstructive symptoms vary in amount in different cases, being particularly marked where there is ophthalmic phlebitis; they may entirely disappear with the development of the collateral circulation.

Shortly before death the same symptoms usually appear in the other eye, often with a recession of symptoms in the first eye. The involvement of the second eye indicates the extension of the thrombus through the circular sinus to the cavernous sinus of the other side, and makes the diagnosis practically certain. MacEwen (2) says that involvement of the second eye occurs in more than half the cases. One hundred and thirty-four autopsies collected by Dwight-Germain (4) showed

only thirty-one in which the thrombosis was limited to one cavernous sinus.

The second group of local symptoms comprises the various paralyses of the nerves within the cavernous sinus. The third nerve is most often implicated, ptosis being one of the most constant symptoms, though often not available for diagnosis on account of the great œdema of the upper lid. Strabismus varies, depending upon the priority of involvement of the third, fourth, and sixth nerves, and soon gives way to complete ophthalmoplegia.

The various paralyses may occur early and are best observed in the cases of slow development, particularly those in which the infection comes from behind. In the more acute cases and in those in which the infection comes via the ophthalmic vein, the displacement and fixation of the eyeball from intraorbital pressure often occurs before any distinct paralyses can be recognized. The pupil, small at first, is widely dilated, sluggish, then immovable. The cornea becomes hazy and anæsthetic, and may break down from exposure. Increased lacrimation, according to Weeks (7), is soon followed by comparative dryness of the conjunctiva. Neuralgic pain in the first division of the fifth nerve may occur, but is much less common than headache.

Vision fails or is lost according to the pressure on or stretching of the optic nerve. Its measurement however is usually impracticable on account of the general condition of the patient. In four cases which recovered, quoted by Jackson (5), only one had good vision, and in Johnson's (9) and Davis's (22) cases vision was lost.

The ophthalmoscopic symptoms are not ordinarily important and may be lacking, probably because of the free anastomosis of the ophthalmic veins with the facial and with the pterygoid plexus. If the fundus can be seen, fullness and tortuosity of the retinal veins is usually found, with perhaps slight blurring of the margin of the disk; neuroretinitis and retinal hemorrhages may occur. These are symptoms of obstruction of the ophthalmic and retinal veins rather than of cavernous sinus thrombosis. The course of the disease seems ordinarily too rapid to allow the development of a well marked optic neuritis.

DIAGNOSIS.

Septic thrombosis of the cavernous sinus will be thought of whenever any exophthalmos shows also septic and cerebral symptoms, or when any case of probable cranial sinus thrombosis develops orbital symptoms. The combination of lid swelling, conjunctival chemosis, exophthalmos, and paralysis of a nerve within the sinus on the same side as an infective lesion anywhere about the head is quite characteristic, and the diagnosis is made certain by the similiar involvement of the other eye.

When the infection comes from behind or below, the process extends from the cavernous sinus to the orbit, and the general symptoms of sinus infection precede the local or orbital ones. Here the first appearance of the characteristic local symptoms makes the diagnosis easy, and an earlier diagnosis is possible than in the cases infected from the front. In the cases where the infection is by way of the ophthalmic vein, as for example where the sinus involvement originates from a previous orbital cellulitis, orbital symptoms precede the sinus infection. Here the involvement of the sinus is marked by the deepening of the symptoms of the cellulitis, and the addition of those of cavernous sinus infection. In these cases it is more difficult to be sure of the diagnosis until the second eye begins to be involved.

The precise order in which the symptoms appear may thus depend upon the source and path of the infection. Familiarity with the possibilities of infection in this region, and a clear mental picture of the pathology of sinus thrombosis, are of more service than statistics of symptoms in making an early diagnosis.

DIFFERENTIAL DIAGNOSIS.

Septic cavernous sinus thrombosis is to be differentiated from other pathologic processes within the cavernous sinus. These, according to Langworthy (3) are: Injuries from gunshot wounds, from fractures at the base of the skull, and from operations on the Gasserian ganglion, the hypophysis, and the sphenoidal sinus; arterio-venous aneurism; malignant or congenital new growths involving the sinus; marasmic or aseptic thrombosis; and perhaps intermittent exophthalmos. In all

these the history, the rate of development, and the other symptoms should afford basis for diagnosis.

Infective sinus thrombosis is to be further differentiated from pathologic processes within the orbit. Of these orbital cellulitis and orbital thrombophlebitis limited to the orbit (the latter, according to Weeks (7), occurring practically only in erysipelas) offer the most difficulty. These have, however, no cerebral symptoms unless the process extends to become either sinus thrombosis, meningitis, or cerebral abscess.

Exophthalmos and other symptoms which might possibly cause confusion are also present in: 1. Tenonitis, which is a much milder condition, often suggesting rheumatic infection and associated with trauma or with infectious disease rather than with an infective focus. 2. Periostitis, with thickening and tenderness of the orbital periosteum and with less interference with eye movements. 3. Panophthalmitis, with the infection mainly inside the globe. 4. Dacryo-adenitis, a rare affection. 5. Infection of the nasal accessory sinuses adjacent to the orbit. 6. Exophthalmic goiter. 7. Tumors and cysts of the orbit, of the optic nerve, and of the lacrimal gland.

COURSE.

In infective cases the obstructive symptoms, exophthalmos, lid œdema, and chemosis, develop early and gradually, and ordinarily reach their maximum in two to five days, rarely ten or more, when they begin to subside. The development of the process in the second eye is a late symptom and is much more rapid, being often a matter of hours. The nerve symptoms come early and are soon masked by the obstructive symptoms. The sepsis grows more profound, and embolic processes, especially in the lungs, are frequent. Meningeal symptoms and those of increased intracranial pressure often develop. and death regularly follows from sepsis in six to forty-eight hours after the involvement of the second eye.

AUTOPSY FINDINGS.

Autopsy findings by various observers agree only in that the cavernous sinus contains a thrombus, often partially disin-

tegrated, or a purulent fluid; that usually both sinuses are involved; and that there is frequently a basilar leptomeningitis. Other findings depend upon the source, route, and nature of the infection.

PROGNOSIS.

The process is always fatal if the thrombus is infected and is not drained. If the symptoms arise simply from an obstructing sterile clot by extension from the sigmoid sinus, and this clot does not become infected because of early operative interference on the sigmoid, recovery may be possible. This has actually occurred in three cases quoted by Dwight-Germain (4), in one by Adair-Dighton (8), and in one by Johnson (9). Bircher (10) went through the petrous portion of the temporal bone and drained pus from the posterior end of the cavernous sinus, successfully. Langworthy (3) quotes three recoveries from drainage of the infecting source only; in these it seems fair to assume that the thrombus in the cavernous sinus was not infected.

In some such way must the few recoveries, where septic thrombosis of the cavernous sinus has been diagnosed, be explained. The total of recoveries in nearly three hundred cases[1] reported in the literature amount to twenty-three, about 7%. Eliminating those recoveries which may be explained as above, and considering the great number of observers, the fragmentary character of many of the reports, and the possibilities of inaccuracies and of errors in diagnosis, we are forced to the conclusion that thrombosis of the cavernous sinus is practically always fatal if the thrombus is infected and is not drained.

TREATMENT.

Except for drainage of the infective source, and drainage of the lateral sinus in ear cases, the treatment of cavernous sinus thrombosis is so far practically nil. The only hope of effectual treatment lies in the analogy of this condition to thrombosis of the lateral sinus, where early diagnosis and prompt, bold, and

[1] The exact number of cases reported is uncertain, as collections by different authors contain a few of the same cases, and sufficient data is not always given to surely identify all of these.

thorough surgical intervention saves many lives. Theoretically, if the cavernous sinus were attacked exactly as the otologist attacks the lateral sinus, by free incision, removal of the clot or its septic part, and drainage, some cases should recover, especially those in which diagnosis and operation are made early. The difficulties in such a procedure are obvious. Lateral sinus infection is common and its operative technique has been well developed, while cavernous sinus thrombosis is too rare to allow any surgeon to see more than a few cases. By the time the diagnosis is usually made and the question of operation arises, the sepsis has progressed so far as to make the chances of recovery slight. The cavernous sinus, too, is surgically one of the least accessible structures in the body, and few operators care to explore it. The feasibility of its drainage has, however, been demonstrated in operations by Hartley (12), Dwight-Germain (4), Ballance (13, 27), Ballance and Hobhouse (13), and Voss (14), all of whom approached the sinus by the Hartley-Krause Gasserian ganglion route, through the side of the skull; by Mosher (15) and Adair-Dighton (24), going through the orbit; and by Bircher (10), in an ear case, going through the petrous portion of the temporal bone to the posterior end of the sinus. The last case was the only one to recover. This, however, is not a fair measure of the success of the operation. In some cases the operation came too late to relieve the sepsis; in some the sinus itself was missed. In Hartley's case a sarcoma was found in the sinus, and this was the cause of the patient's death two months later. In Dwight-Germain's case, age 40, incision into one sinus completely relieved the interference with the circulation in both sinuses. While drainage of one sinus in Adair-Dighton's case, age 6, did not drain the other, the original focus in the nose was overlooked.

Other routes to the sinus seem possible. Luc proposes an extension of his operation for exposure of the maxillary antrum. Beck has successfully operated hypophyseal tumors by way of the antrum, following Jansen's method. Langworthy (3), as a result of cadaver study, proposes a nasal route through the roof of the sphenoidal sinus, a route which Hirsch and others have successfully followed in operations upon the pituitary body in acromegaly.

Of the possible routes by which the cavernous sinus may be surgically reached, that from in front is in the field of the ophthalmologist, those from below in that of the rhinologist. The brain surgeon has developed entrance through the side of the skull, and one otologist has reached the sinus from behind. The weight of evidence so far favors the Gasserian ganglion route, though the route through the sphenoidal sinus may be more attractive to those who have gained experience in this region by operating upon the pituitary body. It may prove that the choice of routes will be that with which the operator is most familiar; or perhaps that by which the infection has entered. The observations of military surgeons in injuries of the cavernous sinus may throw light upon the question. Meanwhile we do not know how many of these theoretic considerations are practical.

Operative interference has so far few advocates and fewer practitioners, though its feasibility is admitted and it seems to be the only rational treatment when it has been better worked out. With many surgeons of experience the objections to operation outweigh its advantages, though this fact may be discounted by the natural conservatism of the profession toward all unproven measures. Opinion is not unanimous. Many agree with De Schweinitz (26), who thinks that "operation would seem to be proper," and with Frazier who is quoted by Pooley (25) as saying that "Direct attack on the cavernous sinus should be made in the hope of saving more lives."

Langworthy (3) makes the point that until we have a better understanding of the very early signs of the disease, we cannot expect to improve in either diagnosis or surgical treatment. This should be gained by a more general alertness and more careful observation in that class of infections from which thrombosis of the cavernous sinus may develop.

CONCLUSIONS.

A study of septic cavernous sinus thrombosis indicates:

I. The hopelessness of any but surgical measures, first to the source of infection, second to the sinus itself.

II. Septic cavernous sinus thrombosis is an operable

condition. The sinus should be opened and drained if a definite diagnosis can be made before the patient becomes too septic.

III. An early definite diagnosis can be made in at least some cases, if the original observer is familiar with the condition and is sufficiently alert. Discussion of the subject may therefore be of value, as many cases doubtless go unrecognized. More careful study of the earlier symptoms is needed, and the possibility of sinus thrombosis developing from apparently trivial infections about the face and head should be kept in mind.

IV. A larger number of cases operated upon is necessary before more definite conclusions can be drawn. And in view of the hopelessness of non-operative measures and the possibility of saving an occasional case by early and thorough drainage of the sinus, the operation should be undertaken whenever there is any reasonable possibility of success.

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ACUTE STREPTOTHRIX INFECTION OF THE CONJUNCTIVA.[1]

By Dr. ARNOLD KNAPP and Dr. JAMES G. DWYER, New York.

Clinical Report. Miss W. U., aged 30, while nursing a delirious patient who was suffering from uremia, cystitis, and pernicious anæmia, received some of the expectoration in her left eye. The patient had a very bad typhoid mouth. On the afternoon of the following day, March 30th, the eye became inflamed and itchy. On March 31st the inflammatory symptoms were aggravated and the discharge became purulent. In the afternoon the nose and throat became sore and the preauricular gland enlarged. The eye was treated with salt irrigations and argyrol without any improvement. When I saw the patient on April 2d, the lids of the left eye were red and swollen, extremely tender, particularly in the region of the retrotarsal folds. On everting the lids the conjunctiva presented a large number of follicles which were larger than those seen in trachoma, more separated, and some showed a yellow tinge. The whole left half of the face was tender; the auricular gland was enlarged and sensitive. The patient was then referred to Dr. Dwyer for a bacteriological examination. On April 3d the condition of the eye was worse and she was advised to enter the eye hospital. The nose caused a great deal of distress. On that afternoon there was not much secretion from the conjunctiva, and the follicles were about the same. On inspecting the pharyngeal wall and the regions posterior to the palatal arches, the same type of follicular inflammation was observed.

The treatment of the eye consisted in silver nitrate, boric acid irrigations, and iced aluminum acetate pads. There was a gradual improvement, particularly from April 7th. The follicles slowly disappeared from the conjunctiva and

[1] Presented before the Section on Ophthalmology, New York Academy of Medicine, March, 1918.

the swelling of the preauricular gland decreased. The pharyngeal condition was also much improved. On April 10th the conjunctiva of the eyelids was still red and thickened, but the follicles had disappeared. The swelling in front of the ear had gone and the throat was much better. The patient, however, was extremely languid and still suffered from the after-effects of considerable poisoning.

On April 17th, Dr. Dwyer reported that the smears were all negative. The cultures from the eye, nose, and throat gave a growth of streptothrix. The culture from the eye was pure but those from the nose and throat were mixed with other organisms.

From the literature, the streptothrix is usually associated with chronic conditions of the eyes, and it is rare to find it as an acute infection. However the method of infection was so direct here that the throwing in of an organism of even low virulence in such a manner would easily give an acute condition. The analogous condition of sporothricosis, described by Schenck and others and which is more common, is usually an acute infection but the morphology of the organism is very dissimilar and can easily be differentiated.

SCIENTIFIC REPORT:

I. Morphology.

1. Direct examination shows rod-shaped organisms with typical true branches. Very occasionally the end of the branch shows a club-shaped end.

2. Subcultures morphologically show almost the same appearance with however the branches more clearly marked. True branching appears. The organism is Gram-positive and is easily stained by the ordinary watery dyes.

II. Cultural.

Growth very scant on meat infusion agar of .5% acidity. Growth much better on glucose meat infusion agar. Growth on gelatine the same as agar and gelatine is not liquefied. There is nothing characteristic on any other media, the whole appearance of the growth resembling that of other members of the higher bacteria.

III. Animal pathogenicity.

1. Local inoculations—rabbits.

(*a*) Rubbing into the skin was negative after two months.

(*b*) Rubbing into conjunctival sac of one eye was followed in ten days by an intense conjunctivitis, with "steaming" of the cornea and then an ulcerative keratitis which went on to loss of the eye.

(*c*) Inoculation into the anterior chamber of the other eye was followed by a low grade hypopyon, lasting for two weeks with a gradual extension as a cyclitis and loss of the eye. This process lasted over one month.

(*d*) Subcutaneous inoculation was followed by the formation of several subcutaneous abscesses of a very low-grade indurated character and which took three weeks to develop. These abscesses were of the "cold" variety, were apparently painless in character. Upon evacuation of these abscesses, a thin colorless fluid was obtained, which contained flakes floating here and there. These flakes morphologically showed the streptothrix, as described above. The animals did not die until three and one half months after inoculation and at this time the abscesses were still of the low indurated variety but the contained pus was very thick and creamy with very few organisms. At autopsy the animals (two) showed general emaciation and deposits in the spleen and in the lung in one of them.

Through the bronchoscope, a broth culture of the organisms was blown down into the left lung. This was followed by a pneumonia on that side in five days, an extension to the right and death in six days. At autopsy, the organisms were recovered from both lungs and the typical appearances of pneumonia were present.

2. Inoculations—guinea-pigs.

With the exception of the eye experiments, the same findings were apparent in four pigs.

REPORT OF THE ANNUAL CONGRESS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. HENRY DICKINSON, London.

The annual Congress of this Society took place in London during the three days May 2d to 4th, under the presidency of Mr. E. Treacher Collins, F.R.C.S., and, despite the war and the consequent transfer of a large proportion of the medical talent into the Army, may be voted a distinct success, both in regard to the attendances and the quality of the contributions submitted. Most of the formal discussions took place at the rooms of the Royal Society of Medicine, but, in addition, a clinical meeting was held at the National Hospital for the Paralyzed, in Queen Square, and a visit was paid to the Metropolitan Asylums Board Ophthalmia School, at Swanley in Kent, of which the President is Consultant, and an interesting discussion took place there on **contagious diseases of the conjunctiva.**

Advantage was also taken of the presence of so many ophthalmologists from the various parts of the Kingdom to hold a meeting for the purpose of forming a Council of Ophthalmologists to watch and take measures concerning the national well-being from this special standpoint. There was complete unanimity, and the speeches of leading members of the specialty favored a stiffening of the qualifications to practice the special branch. It was agreed that the Council shall consist of all the past and present presidents of the Ophthalmological Society of the United Kingdom and of the Royal Society of Medicine Section of Ophthalmology (these to be permanent members), four members, elected annually, from

the Councils of each of these bodies, and one representative of the Oxford Ophthalmological Congress.

THE PRESIDENT'S ADDRESS.

Mr. COLLINS, in opening the proceedings, said the Society was not a body which awoke into activity on three days in the year, and lay dormant during the remaining 362. Matters of ophthalmological interest requiring constant vigilance and care were constantly arising, and he instanced the question of visual standards for the Army, and the more energetic manufacture and supply of Captain Cruise's visor for military use. The War Office had recently created the post of Consulting Ophthalmic Surgeon to the Forces at Home, and he congratulated Colonel Herbert Parsons on being appointed to that important position. Numbers of men had, during the war, been transferred from countries in which contagious ophthalmia was perennially rife to others in which it was of only sporadic occurrence. Many men, free from any contagious eye disease had been sent into districts where, it was estimated, 90% of the population had trachoma, or had had it at some time. These men would, in due time, return and mix with their own uninfected kith and kin. He thought some concerted action should be taken to prevent a repetition of what took place—infection on a large scale—on the return of our troops from Egypt after the Napoleonic wars. He referred to the cohesion among ophthalmologists which had been brought about by affiliation of provincial societies and by the merging of various ophthalmological journals into one. There was still ground for dissatisfaction, he said, in regard to the visual tests for the performance of various duties in the public service, and for the carrying on of certain occupations in which defective eyesight might prove injurious. Blindness arising from the curable condition ophthalmia neonatorum was still far too frequent, and further efforts were required in the direction of caring for the eyesight of children during the unnatural visual strain of school life, especially in the provision of curricula for short-sighted pupils. He made a strong appeal for a definite training in ophthalmology before medical diplomats were allowed to practice the specialty. He concluded by

announcing that the 1919 Bowman Lecture would be delivered by Dr. Morax, of Paris, and that the Edward Nettleship Gold Medal and Prize had been awarded to Lieut.-Colonel Gordon Holmes, M.D., for his valuable work during the last three years on disturbances of vision in association with cerebral lesions.

Effects of Hypotony in Rabbits' Eyes.

The PRESIDENT followed with a paper on this subject. He said the intraocular tension was lowered by (1) paracentesis of the anterior chamber; (2) trephining the vitreous chamber. Eyes so operated upon were excised half an hour and an hour later, and then hardened in Zenker's solution. A serous effusion into the interior of eyes so hardened shows as a granular coagulum. In the eyes in which the aqueous humor was evacuated this granular coagulum was found completely filling the anterior chamber, but did not pass backwards through the pupil: though there was some found in the periphery of the posterior chamber about the anterior part of the ciliary body. In the eyes in which the vitreous was trephined, granular coagulum was found, filling the anterior chamber; in the vitreous extending back from the posterior part of the ciliary body; raising the epithelium of the anterior part of the ciliary body in the form of blisters; on the inner surface of the retina at the posterior pole, and in the supra-choroidal lymph spaces. He thought there could be little doubt that the exudate external to the choroid and on the inner surface of the retina came from the veins of those structures, owing to the alteration of the relation of blood-pressure to intraocular pressure. In the same way, the serous exudate in the anterior chamber probably came from the veins of the iris. There was no continuity between the clot in the anterior chamber and that in the neighborhood of the ciliary processes, as would be expected if the serous exudate came from the ciliary body. Under normal conditions of intraocular tension the veins of the iris acted as excretory channels for the aqueous humor; when the tension becomes diminished, a serous exudation proceeds from them instead.

Lieut.-Col. ELLIOT agreed that the abundance of the exudate in any part of the eye was an evidence of the difference be-

tween the pressure within and the pressure without the vessels at that point, despite a recent French article which denied there was any circulation within the eye. The contribution of the President he regarded as of great importance.

Sir GEORGE BERRY (Edinburgh) joined in congratulating the author, and said it would be of great interest to know, now, what happened when the ocular tension was gradually reduced, as in the gradual softening associated with interstitial keratitis.

Mr. GEORGE YOUNG maintained that it was not necessary to enter the anterior chamber when operating for chronic glaucoma, and described the double sclerotomy he did, as outlined by him in New York in 1912.

Dr. G. MACKAY (Edinburgh) thought passing through the ciliary body, as presumably Mr. Young did, must injure its secreting function.

The PRESIDENT replied.

Lieut.-Col. R. H. ELLIOT, I. M. S., read a paper on **a contribution to the histology of the trephined disk.** He said that for some time he had been examining the trephined disk. To get the best results, the disks must be cut strictly in the meridianal plane of the eye, otherwise the most erroneous conclusions might be drawn. For a trephining operation to succeed, it was probably essential that a portion of Descemet's membrane, or of the pectinate ligament, or both, should be completely removed. In every glaucomatous case which had been examined, there were hyaline thickenings on Descemet's membrane, close to where it was about to break up to form the pectinate ligament, and always on the posterior surface, hence he concluded they were products of the activity of the endothelial layer of Descemet's membrane. Possibly their occurrence bore no relationship to the glaucomatous process, but they might be a result of the chronic congestion attending long-continued high pressure in the eye.

Capt. THOMSON HENDERSON regarded Descemet's membrane as a deposit due to the activity of the epithelium lining the anterior chamber. The fœtal eye, in both man and animals, had a very inconspicuous Descemet's membrane, while it was larger the older the owner. He considered that the anatomical cause of glaucoma was the fibrous degeneration of the cribriform ligament.

The PRESIDENT agreed there must be a sound anatomical basis for a proper understanding of the physiology. Only in one zone of the circumference of the eye could a true filtering scar be secured, and that was, as Col. Elliot had pointed out, at the sclero-corneal margin. The operator must keep well forward, and aim at getting a complete circle of Descemet's membrane.

Capt. R. R. CRUISE contended that it was unnecessary, in order to secure a good filtering scar, to excise a circular portion of Descemet's membrane. He had derived better results from a modification of Fergus's sclerotomy flaps, by which incision of Descemet's membrane was avoided.

Mr. HOSFORD agreed with Mr. Cruise and said he and Mr. Brooksbank James had been doing a modified Lagrange.

Mr. GEORGE THOMPSON described four cases of **herpes zoster affecting the ciliary nerves,** and the communication was discussed by several members.

Capt. R. R. CRUISE exhibited a greatly improved design of visor for the Army, the outcome of a careful analysis of the criticisms evolved as a result of hard wear and tear of the pattern submitted to last year's Congress, when the Society passed a strong endorsement of visors being supplied, as thereby a large proportion of eye injuries at the Front could be avoided. The present design he regards as quite fool-proof. A central strut keeps the chain mail away from the nose, the mail is preserved motionless in front of the eyes, and when not in use can be put on to the top of the steel helmet in one second. The shooting accuracy of the wearer was not impaired, and in a bright light it was an advantage.

Col. LISTER agreed that the submitted model was a beautiful one, and there was a surprising apathy about its universal supply. He thought there might be an objection to wearing it with the gas-mask, especially in hot weather.

Mr. GEORGE YOUNG gave a contribution on clinical tests for the threshold of light and color. His plan was to place circles of color of definite degrees of intensity on the leaves of a small album. These leaves are then rapidly turned in view of the patient. He had noted, as a result of many observations by this quick method, a definite relationship between the color-perception and certain diseases. For example, the light

sense was much affected, while in the retinitis of pregnancy the perception of yellow was very much reduced.

Dr. W. W. SINCLAIR spoke highly of the album, which for quick diagnosis, especially of scotomata, was the best thing he had yet encountered.

The afternoon session was devoted to a demonstration and discussion on **plastic operations on the eyelids.** The major part in the event was taken by Maj. GILLIES, R.A.M.C., who has been very successful in his efforts to increase the comfort and appearance of these victims of the war. He not only exhibited a number of soldiers from the special hospital at Sidcup, but demonstrated, by means of the epidiascope, his operative plans, and the successive stages by which an approach to the normal appearance was reached. Many British and Colonial surgeons were present and contributed to the discussion, at the end of which Maj. Gillies was cordially thanked.

Contagious Diseases of the Conjunctiva.

On the following morning, members journeyed to Swanley, to inspect the Ophthalmia School, which is under the direction of the Metropolitan Asylums Board, with Mr. Treacher Collins as Consulting Ophthalmologist. Here a discussion was held on the subject of contagious diseases of the conjunctiva. It was initiated by the reading (by Col. Lister, A.M.S.) of a joint communication by Maj. J. F. CUNNINGHAM and Capt. J. WHARTON. The authors stated that the question of trachoma and conjunctivitis of the ordinary kind arose in consequence of the introduction of colored units into France. 19% of the Egyptians brought into France had active trachoma, and 9% of the Chinese had it in that form. Infected cases were separated from the clean, and kept isolated from them. The authors had no knowledge, at the time they wrote, of any cases in which the disease had spread either to the civilian population or to our own troops. The infected cases were improving under treatment, and the sickness-hours among them did not exceed those in clean Companies. The importation of cases of trachomatous granulations or acute conjunctivitis had been stopped. The object of treatment was not so much cure as to keep the men fit and to prevent the spread of the disease.

Camps for both Chinese and Egyptian Labor Companies were enclosed, and the men not allowed out of their camps, except for work. On no account was a man transferred from an infected to a clean Company. Less than one man per month had had to be repatriated in consequence of the disease. The task of inspection and placing the men into their proper categories was very heavy, and involved traveling many hundreds of miles. This work was admittedly done very efficiently. The universal drop treatment was that carried out; once a day the men were formed into rows, squatted down and drew down their lower lids while looking upwards, and a native orderly passed along administering two drops of the following preparation: acid bor. grs. X., zn. sulph. grs. II, water to 1 oz. In this way a whole Company could be treated in about twenty minutes.

Col. LISTER said he could testify to the splendid work which Maj. Cunningham had done in this connection. If the men coming in had not been properly classified to begin with, the whole scheme would have been wrecked.

The PRESIDENT gave a short account of the work at this School. All children were admitted who had a discharge from the eyes capable of being conveyed to the eyes of another child. Of the 7163 children who had been admitted since 1903, 1697 were diagnosed as suffering from trachoma, and 5466 from other contagious eye affections. In the school, the trachoma cases are kept separate from the others. The causative factor seemed to be an ultra-microscopic organism which did not seem to be transferred through the air, but in moist discharge conveyed from one person to another. Exacerbation of symptoms in cases of trachoma seemed to be always associated with the presence of some well-known bacillus, such as the gonococcus. In trachoma there was an enlargement of lymphoid follicles, due to a chemical irritant, an invasion of the subepithelial tissues, and a new formation of lymphoid tissue. The reason trachoma was not met with anywhere except in the loose subepithelial areolar tissue he regarded as due to the peculiarity of that arrangement. When the areolar tissue was replaced by fibrous tissue, the disease was arrested.

MR. TYRRELL (Medical Officer of the Schools) discussed the

disease and demonstrated treatment of it by means of CO_2 snow.

Mr. M. S. MAYOU gave his view of the histology of trachoma, aided by colored drawings. He mentioned with high approval the use of jequeritol for this disease. The subject was also discussed by Mr. J. B. STORY (Dublin), Lieut.-Col. ELLIOT, Maj. DERBY (U. S. Army), and Mr. GIRI.

The proceedings terminated with two clinical meetings, one at the Royal Society of Medicine, and the other at the National Hospital for the Paralyzed, at both of which many cases of much interest were demonstrated and discussed.

A Museum was held in an adjacent room during the three days, under the direction of Mr. A. C. HUDSON, and on Thursday evening members and guests dined together.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

By JOHN M. WHEELER, M.D., Secretary.

MONDAY EVENING, MAY 20, 1918. MARTIN COHEN, M.D., CHAIRMAN.

Acute streptothrix infection of conjunctiva, Drs. KNAPP and DWYER (appears in this issue).

DISCUSSION: Dr. C. H. MAY showed a case of **chronic streptothrix infection of the conjunctiva.** This patient has had many different forms of treatment without improvement, and now has contraction of the conjunctiva and other sequelæ.

Dr. CUTLER said that the appearance of the lower lids in Dr. May's case suggested pemphigus.

Dr. THOS. A. MULCAHY reported a case of **tuberculoma of the iris** with pathological findings.

This case is of interest because of the report of the pathological findings and it also emphasizes the value of the general tuberculin reaction.

CASE.—I. H., aged 3 years, was admitted to the New York Foundling Hospital in April, 1915, and was treated as a feeding case. Her first eye trouble was noticed when she was about one year of age together with swelling of the phalanges.

The writer saw the patient for the first time when she was 2½ years old. She had photophobia, circumcorneal injection; there was a small yellowish white mass in the lower outer quadrant between posterior surface of the cornea and the iris. This tumor was spherical in shape, the size of a pea, sharply outlined, with a few blood vessels on the surface. Pupil irregular and pupillary space contained a fibrous exudate; anterior chamber deep.

Four Wassermanns were negative, the last being a provoca-

tive one. Three von Pirquets were made; the last was mildly positive. A general tuberculin test was positive both locally and generally. The patient died of pneumonia following measles.

At autopsy, lesions found were double lobar pneumonia, many caseous bronchial lymph nodes, and amyloid liver. The left eye, one finger, and lymph node were examined by Dr. James Ewing of Cornell University. His report as to the eye was as follows: "In the iris and about the cilary body there is a rich infiltration by lymphocytes, plasma cells, proliferating blood vessels, and in the blood vessels and about them are many polynuclear leucocytes. At several points there are focal collections of lymphocytes. These changes are consistent with a tuberculous origin." No tubercle bacilli were found.

Dr. M. URIBE-TRONCOSO presented a case of **unilateral Argyll-Robertson pupil.** Patient is 35 years old, affected with tabes involving both cervical and lumbar enlargements of the cord; the former probably first according to Dr. Joughlin, who studied the patient in the neurological clinic of the Post-Graduate Hospital. He gave a specific history, the infection being acquired seven years ago, the only treatment he has ever received being six intravenous injections of salvarsan taken at the time of the original infection. There is marked incoördination in the legs and arms and a loss of the sense of "touch" and of the postural sense in the hands which is the cause of the ataxia. Rhomberg sign and definite ataxia in walking are evident. The cranial nerves are unaffected, except the fifth. The right pupil is larger than the left and shows no direct reaction to light, but reacts promptly to convergence. Illumination of this pupil produces consensual reaction of the other. The left pupil reacts well to light and accommodation. No consensual reaction can be observed by the naked eye of the right pupil, but with a loupe the indirect response is unmistakable. Using a very strong light and observing with a loupe a faint contraction of the iris muscle can be detected on direct illumination of the right eye. Vision $\frac{20}{20}$ in both eyes. Accommodation normal. Fundus normal. Visual fields present a slight contraction for white and restriction for colors.

Unilateral Argyll-Robertson pupil is of comparatively rare

occurrence, two or three cases being observed among a large number of tabetic or syphilitic patients in the neurological clinics. The pathological lesion seems to be a breaking of the reflex path between the nucleus of the oculomotor nerve and the anterior corpora quadrigemina. Generally the direct and the consensual reactions (by illumination of the other eye) are abolished, but there are some cases as those studied by Lutz recently and in the speaker's case in which a consensual response can be obtained in the inactive pupil by the illumination of the good eye. This fact cannot be explained when a second decussation of the optic fibers is not admitted between the corpora quadrigemina and the oculomotor nucleus. In many of the best text books the schemes of the optic pathway show no decussation of these fibers, which run directly from the optic tract to the nucleus of the oculomotor on the same side. Commissural fibers joining both nuclei are pictured. Still it is an anatomically proved fact that this second decussation exists, but probably it is only partial.

Dr. URIBE-TRONCOSO presented a case of **tumor of the sphenoid with ocular manifestations,** a girl 11 years old, who when first seen in March, 1918, complained of loss of vision in the left eye. Trouble began about one year ago when after severe headache the mother noticed the eye was "crossed." The school nurse took her to a clinic where she was refracted but without any avail. Family history negative. When seen in March there was a marked divergent strabismus of the left eye. Slight exophthalmos. The root of the nose on the same side is enlarged laterally and slightly prominent. No restriction in the movements of the eye. On palpation a hard bony mass could be felt at the upper and inner angle of the orbit. Vision reduced to light perception. Ophthalmoscopic examination of the left eye showed a complete postneuritic atrophy of the optic nerve. The right eye had $\frac{15}{20}$ vision and fundus examination showed a mild optic neuritis. Visual field was markedly contracted in a concentric way for white and colors, and the contraction was specially noticeable upward and outward. Wassermann and von Pirquet tests were negative. X-ray examination showed the whole floor of the frontal fossa thickened, with marked encroachment of the left nasal fossa. Marked density in the frontal sinus region and the left eth-

moid and specially the sphenoid sinus. On lateral posture a marked sclerosis is apparent in the region of the sphenoid sinus. The sella turcica is small.

The author thinks this sclerosing process is due to a new growth, of comparatively benign course, it having lasted for about one year. It is almost certainly an osteoma of the eburnous type, since osteo-sarcomata of this region are very malignant especially in children. It is very difficult to say when the tumor began, but all data point to a former invasion of the sphenoid bone and the eye findings support this view. The slight exophthalmos indicates that the cavity of the orbit has been reduced only slightly. Compression and inflammation of the optic nerve began first in the left side and ended in blindness; the right eye being spared until lately when the papillitis started. It is a well known fact that tumors of the sphenoid never produce compression of the chiasm before involving the optic nerves. Hemianopsia has never been observed because the chiasm is not directly in contact with the sphenoid bone, being separated from it by the anterior part of the hypophysis. According to Lagrange osteomata of the cranial cavity which reach behind the orbit are exceedingly rare.

Dr. SINCLAIR TOUSEY said that the anteroposterior picture presents an apparent blocking of the nasal fossæ which may be due to the opacity of the body of the sphenoid and not to an extension of the sclerosis to the septum or turbinated bones.

Dr. GUTMAN said it is hard to understand the presence of an osteoma and believes that the condition is better explained by a syphilitic process.

Dr. URIBE-TRONCOSO referred to the well-known fact that an empyema of one sphenoid sinus may affect both nerves. Osteoma may act in the same way. Probably the condition is not luetic as the patient is a small child, the Wassermann is negative, and there is no sign of lues.

Dr. L. W. CRIGLER presented two cases of **vernal catarrh of the bulbar type.** One was that of a boy 9 years of age who had had a recurrence every spring for the past five years. His father stated that he was similarly affected for twenty successive years, after which the disease entirely disappeared. The

second case was that of a girl, age 7. She had had three successive recurrences.

The cases were presented because of their striking similarity to the text-book description of the disease, being confined exclusively to the eyeball, and for the further purpose of securing an expression of opinion from the members of the section regarding treatment.

Asked for some remarks upon radium treatment for vernal catarrh, Dr. Tousey said it is wonderfully effective but the treatments have had to be repeated three or four times a year in the cases so far treated by him. He always protects the eyeball by a concave polished metal shield, which is self-retaining in the conjunctival sac. This is to avoid any possibility of lessening the transparency of the cornea or lessening the sensitiveness of the retina. Asked whether he had ever seen such an effect from radium he said that he had not, but from analogy with the X-ray which presents such a danger, he always shields the eyeball when treating only the lids. Asked in regard to treating diseases of the eyeball itself by direct applications of radium, he said he should not hesitate to do so but would mention to the patient the possibility of the two effects mentioned and should shield every part of the eyeball where the curative effect was not required.

Dr. CUTLER had not seen injurious results from the use of radium in vernal catarrh except a slight haziness of the cornea which may have been due to radium exposure. In a case of glaucoma that refused operation, the affected eye had three exposures to radium. There is some reduction of tension and Dr. Cutler thinks something may be promised by this treatment. He had seen loss of eyelashes from radium exposures.

Dr. MAY had a patient who had radium exposures without protection of the globe. Over a year has elapsed without sign of injury from exposure.

Dr. MCDANNALD had a case which was exposed and relieved of symptoms and the lids were cured of elevations, but irritation followed exposures and patient's vision is slightly reduced as a result.

Dr. REESE had a case of epibulbar epithelioma which yielded to radium after the vessels leading to it had been tied off.

There was no protection of the globe and no impairment of vision resulted.

Dr. W. F. C. STEINBUGLER presented a case of **retinitis circinata.** S. J., female, 57; family and previous history negative. Wassermann negative. Urine negative. Blood pressure 100. Came to the Knapp Hospital clinic April 16th of this year complaining of itching of eyes for some time and poor central vision of the right eye for the last six months. V. R. $\frac{4}{200}$; L. $\frac{20}{50}$. There is a moderate degree of chronic conjunctivitis. On examining the fundus of the right eye a reddish-brown spot, slightly larger than the disk, is seen in the macular region, surrounded by a horse-shoe shaped white patch. The long diameter of the horse-shoe measures about three times the breadth of the disk and lies with its long axis transversely, the convexity of the horse-shoe pointing towards the disk and being very close to it. There are many small white patches in the neighborhood of this figure, scattered both above and below, and at the temporal end are several small shining spots which resemble crystals of cholesterin. The temporal blood vessels can be seen near the margins both above and below. The vessels are not tortuous. The fundus of the left eye is normal.

Dr. WALTER D. EDWARDS reported a case of **acute retrobulbar neuritis of obscure origin associated with tooth infection.** Mrs. R. N., age 38, was first seen April 15, 1918, at the Knapp Memorial Eye Hospital complaining of sudden loss of vision of left eye and slight pain in moving the eyeball. The vision was reduced to hand movements, eccentrically, and there was a well defined central scotoma. The fundus examination was negative, except for engorgement of the retinal veins. The sinuses were reported negative after two examinations and the radiographs showed nothing definite. Examination of the blood and urine was also negative. The teeth were radiographed and a large area of infection about the roots of the upper first left molar was disclosed. This tooth and three others which showed poor root fillings were extracted. Two days later the symptoms became much worse—hemorrhages were noted on the disk, which was swollen 2 D. Strabismus developed, the eye was turned up and out, and the vision was reduced to hand motion in the extreme temporal field. The

condition gradually subsided until at the time of this report the vision is $\frac{18}{200}$. There is still an absolute central scotoma for colors and a relative central scotoma for form. The optic disk shows beginning atrophy on the temporal side.

The case is of interest as being an acute retrobulbar neuritis with marked ophthalmoscopic changes and orbital symptoms (paresis of several muscles) associated with a distinct tooth infection. The extraction of the affected teeth was followed by only a partial recovery. The case will be kept under observation and will be again reported upon later.

Dr. GEO. H. BELL presented a woman, age 60, with an extensive orbital tumor which had been treated with radium. The X-ray plate showed the orbit to be filled by a growth and there was a soft looking area in the frontal bone above the orbit. The tumor in the orbit and on the brow has been absorbed. The patient was treated by Dr. Sinclair Tousey with radium. Dr. Bell exhibited several photographs, showing the marked improvement in the patient's condition. The cosmetic result is now almost perfect.

DISCUSSION by Dr. SINCLAIR TOUSEY. The patient came with her whole head enveloped in a black veil on removing which she presented a ghastly spectacle. The lower eyelid was greatly stretched and so was the eyebrow and the skin of the forehead. The size of the tumor is evidenced by the fact that the radium was applied to six different areas separated by 1½ inch of untreated surface. The radium instrument was in contact with an area about ½ x ¾ inch and the effect of course extended in every direction. And as only the very penetrating rays were employed the expectation was that every part of the tumor would be equally affected. Twenty milligrams of radium salt having a radio activity of two million, *i.e.* 20 millicuries, were used. The radium salt was in a sealed glass tube and that was covered by sheet lead and then by thick sheet rubber. The function of the latter was partly to prevent contamination of the radium instrument through contact with the patient, and partly to arrest secondary rays arising from the lead where the penetrating rays emerged. These secondary rays have little penetration and would be absorbed by the skin and produce a dermatitis during long exposures. Each treatment consisted of an application of one

hour to only a single area. The first application was made to the outer lower part of the eyelid. A week later one was made to the inner lower part of the lower eyelid. Other areas treated in successive weeks were the outer part of the eyebrow, the inner part of the eyebrow, the upper part of the forehead far to the left, and the upper part of the forehead near the median line. The first treatment was on December 19, 1917. By December 31st the tumor had decidedly diminished in size and the skin over it was shriveled. The reduction in size was progressive and a smaller number of areas were treated so that each of the last two remaining areas received a treatment every other week as compared with the one treatment in six weeks given to each area at the beginning. The last treatment was given April 1, 1918, three months and a half after the first, and now two months later not a trace of the tumor remains and the patient seems perfectly well. At no time was there redness or inflammation of the skin from the radium applications.

REPORT ON THE PROGRESS OF OPHTHALMOLOGY FOR THE SECOND, THIRD, AND FOURTH QUARTERS, 1917.

By H. KOELLNER, Berlin; W. KRAUSS, Marburg; R. KÜMMELL, Erlangen; W. LOEHLEIN, Greifswald; H. MEYER, Brandenburg; W. NICOLAI, Berlin; H. PAGENSTECHER, Strassburg; K. WESSELY, Würzburg; and M. WOLFRUM, Leipsic; with the Assistance of Drs. ALLING, New Haven; CALDERARO, Rome; CAUSÉ, Mayence; CURRAN, Kansas City; DANIS, Brussels; GILBERT, Munich; GROENHOLM, Helsingfors; v. POPPEN, Petrograd; TREUTLER, Dresden; and VISSER, Amsterdam.

Edited by MATTHIAS LANCKTON FOSTER, M.D., F.A.C.S., New Rochelle, N. Y.

(*Concluded*)

IX.—THE LIDS.

57. GUÉNOD, A. **A contribution to the study of the pathogenesis and treatment of marginal blepharitis.** *Clinique ophtalmologique*, viii., 4.

58. MADDOX, E. E. **A new operation for ptosis.** *British Journal of Ophthalmology*, June, 1917.

59. MORAX, V. **A new technique for the treatment of total symblepharon.** *Annales d'oculistique*, cliv., 6.

In three cases with a complete obliteration of the conjunctival sacs and adhesions of the two lids by an extensive orbitopalpebral scar MORAX (59, **New operation for total symblepharon**) has succeeded in reëstablishing the interpalpebral fissure and a small socket for a prothesis by employing the following technic:

First Step. (1) A horizontal incision 4 to 5*mm* long and 4 to 5*mm* deep is made through the skin and subcutaneous tissue all along the interpalpebral fissure. (2) Two vertical incisions are drawn at the extremities of the horizontal one,

extending above to the eyebrow and below to the inferior level of the lower lid. The depth of these two incisions is the same as that of the horizontal one. When finished the incisions have the shape of an H. The flaps are carefully dissected up, including as much of the fibers of the orbicularis muscle as possible. The upper flap is turned upwards and its margin is sewed by three sutures to the skin. The lower flap is turned downwards and also fixed to the skin of the face by three sutures. In this manner the raw surface of the flaps remains exposed and at this stage it is covered with large grafts of epidermis, taken from the arm, thigh, or abdomen. A layer of oiled silk is applied directly on the grafted flaps and the wound is bandaged. The wound is inspected after three or four days and the sutures removed on the fifth day.

Second Step. About fifteen days later, when the reaction has subsided, the adherent upper margin of the upper flap and lower margin of the lower flap are freed and the flaps are returned into primary position. A shell of lead or glass is introduced into the space corresponding to the orbital cavity and the free margins of the flaps are sewn together above the shell. The flaps are left in this condition for about two or three months. After this interval, when there is a minimum risk of further retraction of the tissues, the *third and last step* is made. This consists of a horizontal incision, separating the two flaps. Forty-eight hours later the shell is removed and replaced by a prothesis. If the flaps are too soft, they can be strengthened by the transplantation of a piece of cartilage taken from the ear.

SCHOENBERG.

GUÉNOD (57, **Pathogenesis and treatment of marginal blepharitis**) thinks that the pathological substratum of the predisposition of certain individuals to a chronic blepharitis consists of a lack of elasticity of the capillaries of the margins of the lids, and of the Meibomian and sebaceous glands. These individuals have a tendency also to varicosities of the veins and of the lymphatics in other parts of the body (hemorrhoids, lymphatic varicosities, varicocele, varicosities of the veins of the legs, etc.). In such patients any slight irritation of the lids or conjunctiva may produce a capillary congestion which fails to recover and becomes chronic. Very frequently

the hair follicle becomes the prey of the staphylococcus aureus, which is always found on the skin of the lids, and ulcerative blepharitis is the final outcome. The author recommends for chronic congestion of the margins of the lids the frequent use of adrenalin drops in the conjunctival sac, as a stimulant for the capillary contraction. For the ulcerative form he performs a complete epilation of all the ciliæ, applies carefully an iodine-acetone solution on the margin of the lids, and bandages the eye for twenty-four hours with gauze moistened with glycerine. He repeats the treatment in case of recurrence.

SCHOENBERG.

MADDOX (58, **A new operation for ptosis**) points out the disadvantages of the usual operations for ptosis which approach the defect from the skin side of the lid. He suggests a modification of a procedure practiced by Sir William Bowman. The lid is double everted and the levator tendon exposed. The tendon is lightly cauterized, and a supporting tendon passed. The apex of the tarsus is snipped off, and the two ends of the suture passed through it. It is almost impossible from the description to gather exactly how the sutures are inserted. There is a figure, but it is not sufficiently elaborated. Maddox has practiced the operation for four or five years, and has been gratified by the results obtained.

T. HARRISON BUTLER.

X.—THE LACRIMAL ORGANS.

60. FAVA, A. **A rare affection of the lacrimal apparatus.** *Annales d'oculistique*, cliv., 6.

61. JOCQS. **The lacrimal tumor.** *Clinique ophtalmologique*, viii., 4.

62. PETIT, P. **A few words on the technique of extirpation of the accessory lacrimal gland.** *Annales d'oculistique*, cliii., 11.

FAVA (60, **A rare affection of the lacrimal apparatus**) reports the case of a young peasant who had several subcutaneous abscesses of the face, an ulcer in the region of the lacrimal sac, extending deep down into the sac, and three other ulcers in the inferior maxillary region of the left side. The preauricular and latero-cervical lymphatic glands were enlarged. Cultures made on gelatine containing glucose and glycerine, as well as injections in guinea pigs, revealed the presence of nocardia, a

filamentous microörganism belonging to the same species as streptothrix.

SCHOENBERG.

JOCQS (61, **The lacrimal tumor**) repeats his belief in the extirpation of the mucous membrane of the lacrimal sac by cauterization with a 50% solution of zinc chloride as the most efficient method in the treatment of dacryocystitis.

SCHOENBERG.

PETIT (62, **A few words on the technic of extirpation of the accessory lacrimal gland**) suggests the introduction of a suture through the outer third of the palpebral conjunctiva of the upper lid, in order to exert a continuous traction on the subconjunctival tissue and facilitate the appearance of the gland. It is well to begin the excision of the glandular lobules at the internal portion, which is much less vascular than the external portion.

SCHOENBERG.

XI.—ORBITS AND ACCESSORY SINUSES.

63. CARLOTTI. **Enucleation with transplantation of costal cartilage in the orbital cavity.** *Annales d'oculistique*, cliii., 4.

64. FROMAGET, H., and BERTEMES, G. **Pseudoconjunctivitis accompanying fronto-ethmoidal sinusitis.** *Ibid.*, cliii., 8.

65. KIRKPATRICK, MAJOR B. **Double orbital sarcoma.** *British Journal of Ophthalmology*, June, 1917.

CARLOTTI (63, **Enucleation with transplantation of costal cartilage in the orbital cavity**) publishes ten cases of this nature. In six of the cases he employed cartilage with skin, in the last four cases he used only cartilage and the results are most satisfactory. He advises to suture the two horizontal muscles and the superior and inferior recti on top of the cartilage and then to sew up the conjunctiva.

SCHOENBERG.

FROMAGET and BERTEMES (64, **Pseudoconjunctivitis accompanying fronto-ethmoidal sinusitis**) report a number of cases of this condition. It is usually unilateral and consists of a congestion of the bulbar as well as palpebral conjunctiva. There is very little or no mucous secretion; lacrimation is very persistent. The skin of the lids is not irritated, as it usually

appears in artificially induced conjunctivitis. The patients usually complain only of a slight burning in the eyes. The duration is of from one to two weeks. There is a tendency of recurrence every three or four months. The ætiology is easily established by a rhinological examination. Pressure upon the floor of the frontal sinus on the same side with the conjunctival affection elicits a sharp pain. This is characteristic of a frontal sinusitis. The patient is usually not aware of his nasal trouble. The "conjunctival crises," as we could term the occasional attacks of congestion in the eye, coincide with a recrudescence of the fronto-ethmoidal sinusitis, probably due to a stoppage of drainage. Discussing the pathogenesis of these conjunctival reactions they think that the inflammatory process extends from the sinuses along the anterior and posterior ethmoidal, suborbital, and nasofrontal veins to the venous plexus of the orbit.

SCHOENBERG.

The paper of KIRKPATRICK (65, **Double orbital sarcoma**) describing this tragic case is illustrated with a photograph of the patient, and with microphotographs of the sections of the tumor, which was an endothelioma of sarcomatous type.

T. HARRISON BUTLER.

XII.—THE CONJUNCTIVA.

66. AUBINEAU, E. **Remarks on artificially induced conjunctivitis.** *Annales d'oculistique*, cliii., 8.

67. BUTLER, T. H. **Some remarks upon spring catarrh: with special reference to its diagnosis and its treatment with radium.** *British Journal of Ophthalmology*, July, 1917.

68. COSSE and DELORD. **Cases of conjunctivitis in dysenterics.** *Annales d'oculistique*, cliv., 1.

69. COSSE and DELORD. **Ipecacuanha conjunctivitis. Its microscopical diagnosis.** *Ibid.*, cliv., 3.

70. FROMAGET and HARRIET. **Conjunctivitis and pseudo-trachoma artificially produced by soldiers by the introduction of emetin into the conjunctival sac.** *Ibid.*, cliii., 9.

71. GIFFORD, H. **On the frequency of occlusion of the inner end of the canaliculus in old trachoma.** *Ophthalmic Record*, September, 1917.

72. GOLDBACH, L. J. **Lymphatic nodular keratoconjunctivitis.** *Journal of the American Medical Association*, July 14, 1917.

73. GOLDENBERG, M. **The pathogenesis of ophthalmia eczematosa.** *Ibid.*, July 14, 1917.

74. HARDY, W. F., and LAMB, H. D. **Essential shrinking of the conjunctiva with report of two cases.** *American Journal of Ophthalmology*, October, 1917.

75. KALT, M. **Method of discovering the presence of powdered ipecacuanha in the conjunctiva.** *Annales d'oculistique*, cliii., 6.

76. LAMB, F. W. **Conjunctivitis tularensis (squirrel-plague conjunctivitis), with report of a case.** *Ophthalmic Record*, May, 1917.

77. LAWSON, A. **Three cases of infection of the conjunctiva from the fur of cats.** *British Journal of Ophthalmology*, May, 1917.

78. LEIPER, R. T. **Thelaziasis in man: a summary of recent reports on "circumcorneal filariasis" in Chinese literature, with a note upon the zoölogical position of the parasite.** *Ibid.*

79. MOREAU, F. **Electric ophthalmia.** *Annales d'oculistique*, cliii., 8.

80. STUCKEY, E. J. **Circumocular filariasis.** *British Journal of Ophthalmology*, September, 1917.

81. WHITE, D. W. **The new incision and crushing operation for advanced trachoma.** *Ophthalmic Record*, May, 1917.

E. AUBINEAU (66, **Remarks on artificially induced conjunctivitis**) warns the reader to be on the lookout when examining soldiers with a unilateral conjunctivitis and mostly if the process is localized only on one lid.

COSSE and DELORD (69, **Ipecacuanha conjunctivitis**) have seen several soldiers with conjunctivitis induced by the introduction of powder of ipecacuanha, pepper, or tobacco. The conjunctivitis is usually limited to the lower lid; microörganisms are never present and there is no secretion of muco-pus. There are no corneal complications. The condition clears up in a few days if the eye is sealed up by a collodion bandage. They describe the microscopic appearance of the granules of various substances found in these forms of induced conjunctivitis and warn ophthalmologists to be on the lookout for malingerers who have escaped active service at the front for many months by the induction of artificial conjunctivitis.

SCHOENBERG.

FROMAGET and HARRIET (70, **Conjunctivitis and pseudotrachoma artificially produced by soldiers by the introduction of emetin into the conjunctival sac**) say that the inflammation is usually unilateral, mostly in the right eye; the skin of the lids is irritated; there is no discharge of mucus or pus. The conjunctiva has a salmon color and it often has the appearance of trachoma, but the cornea is never involved. The condition clears up in about one week if no new supply of ipecac powder

is introduced. In doubtful cases, where trachoma is suspected, the sealing up of the eye by a collodion bandage for several days will establish the diagnosis. In order to establish whether the powder of ipecac acts as a foreign body or as a chemical substance the authors introduced in the conjunctival sac of a soldier powder of ipecac, of another a few drops of an extract of ipecac, and of a third a few drops of a 2% solution of emetin hydrochloride. In all three of them the symptoms of irritation appeared in from ten to twenty hours later, which fact proves, according to the author, that the action of ipecac on the conjunctiva is of a chemical nature.

SCHOENBERG.

Some soldiers in the French army have introduced powder of ipecac into the conjunctival sac in order to produce a conjunctivitis which may dispense them from active service. KALT (75, **Method of discovering the presence of this powder in the conjunctiva**) employs the following method for detection. A small swab of gun cotton is slightly rubbed on the conjunctiva, caruncle, and margins of the lids, then dried in the incubator at 50°, and dissolved in a few drops of alcohol and ether, 1 to 2. After the mixture has evaporated, a few drops of water are added and it is left again to dry. The pellicle which remains is spread on a slide with a drop of water and examined under the microscope. The ipecac appears as dark masses which turn blue by addition of Lugol's solution, showing the presence of starch.

SCHOENBERG.

COSSE and DELORD (68, **Conjunctivitis dysenterics**) say that this complication has never been reported before and that they have seen it in twelve patients. In four of them the conjunctivitis appeared on the fifth to the twelfth day after the onset of the disease and cleared up in from six to seven days; in eight it appeared at the same time with a polyarthritis of the knee, elbow, tibio-tarsal, and shoulder. In one patient the conjunctivitis preceded the dysentery. The conjunctiva was moderately inflamed; the mucous discharge was scanty and contained no microörganisms. The eye regained its normal appearance in ten days. One single patient developed iritis and marginal keratitis of the right eye. The conjunctivitis was more severe in patients with complications in the joints.

As to the etiology, the authors believe that the conjunctival complication is due to toxæmia and not to microörganisms, since repeated microscopic examinations always proved negative, and the clinical evolution was entirely different from that seen in bacterial infections.

SCHOENBERG.

LAMB (76, **Squirrel-plague conjunctivitis**) reports the case of a girl who after preparing rabbits for a meal developed œdema of the lids of the left eye with ulcers on the palpebral conjunctiva and tender preauricular and cervical glands. The proper diagnosis was made and the bacillus recovered. Inoculation of guinea-pigs with secretion from the conjunctiva proved fatal. The bacillus was grown on egg-yolk medium. Treatment with autogenous vaccines seemed to have had a marked effect for the case recovered in about a month, whereas the progress of the two other cases reported was very tedious.

ALLING.

LAWSON (77, **Infection of the conjunctiva from the fur of cats**) cites three cases in which infection of the conjunctiva in children was caused by fondling cats. There seems little reason to doubt that all animals are dangerous pets for small children. The cat is probably the worst because she is more likely to be fondled.

T. HARRISON BUTLER.

In one of MOREAU'S two cases (79, **Electric ophthalmia**) there was a period of incubation of eight hours between the exposure to the strong electric light and the conjunctivitis. In both there was a loss of superficial layers of corneal epithelium as shown by fluorescin. The loss of substance occupied a horizontal zone corresponding to the interpalpebral space, directly exposed to the lights. The condition cleared up in from thirty-six to forty-eight hours.

SCHOENBERG.

The disease is rare in England. BUTLER (67, **Spring catarrh**) sees about one case in two years, which is an incidence of 1:10,000. The author laid stress upon the constant presence of an excess of eosinophil cells in a smear, a sign which he regarded as pathognomonic of the disease. The clinical features are characteristic, and a surgeon who has seen a typical case will not readily overlook another. It is easier to make the

reverse mistake, to see spring catarrh when it is not present. Unusual cases of phlyctenular conjunctivitis may cause this confusion, but the presence or absence of eosinophil cells will at once clear up any doubt.

It should not be mistaken for trachoma, but when the two diseases co-exist, as they do in the Near East, a mistake can be made.

The author showed the Congress a case which had been greatly improved by radium, and which was ultimately cured. He cited another bad case which had also lost all symptoms of the disease after radium treatment, but in this patient a troublesome conjunctivitis gave trouble for some long time.

Butler regards radium as the only agent which has any influence upon the disease, and he quotes Sir J. Mackenzie Davidson, who states that in every case without exception which he has treated with radium the plaques have completely disappeared without leaving any scars. He looks upon radium as a specific for the disease.

T. HARRISON BUTLER.

GOLDENBERG (73, **Pathogenesis of ophthalmia eczematosa**) is of the opinion that phlyctenulosis is not a tuberculous manifestation but is due to intestinal putrefaction. He finds that nearly all the patients consume an excessive amount of carbohydrates in the form of sweets. He got the best results in treatment by restricting the diet and administering calomel while treating the eyes locally with atropine.

ALLING.

GOLDBACH (72, **Lymphatic nodular kerato-conjunctivitis**) believes that phlyctenules are strongly suggestive of tuberculosis—if not, then certainly something closely associated with it. In seven of the thirty-nine cases studied, there were signs of active pulmonary tuberculosis. Sixteen had some form of tuberculosis, such as adenitis or tuberculous bone lesions; thirty-two had positive von Pirquet. He advocates prolonged treatment with tuberculin.

ALLING.

GIFFORD (71, **Occlusion of the inner end of the canaliculus in old trachoma**) thinks that most of the cases of trachoma suffer from this complication and has frequently found pus pockets in the canaliculus. This condition should be looked

for, especially before operation, and the canals slit and kept open.

ALLING.

The first case of HARDY and LAMB (74, **Essential shrinking of the conjunctiva**) was a young man of 17 whose history shows that a vesicular eruption appeared on the skin when he was nine years old, two months after vaccination. The eyes began to discharge and had a dry grayish appearance. The right eye presented anterior staphyloma and was almost fixed in position by cicatricial bands. There was almost complete obliteration of the fornices. The left eye had vision of 3/96, the cornea being opaque in its lower third and the lower fornix nearly obliterated.

The second case was a colored boy of 11 who had had a skin eruption occurring in the fall for six years. The eye trouble began with one of the attacks, and after two years the vision was reduced to light perception. The conjunctiva was dry and shrunken but not so extensively as the other case, but both corneæ were opaque. This disease occurs once in about twenty thousand eye cases.

ALLING.

STUCKEY (80, **Circumocular filariasis**) reports the case of a Chinese who came to the hospital at Pekin complaining that worms came out of his eye.

On examination four white worms were removed from the conjunctival sac. The organism was found to be *Filaria palpebralis*. The disease has been described in the horse and ox.

T. HARRISON BUTLER.

LEIPER (78, **Thelaziasis in man**) deals with filaria in the conjunctival sac as seen in China in man and animals. The author holds that these parasites are probably identical with *Thelazia callipæda* which is a common eye worm with the dog in Central Asia.

T. HARRISON BUTLER.

WHITE (81, **New incision and crushing operation for advanced trachoma**) dissects the conjunctiva free from the tarsus and then the tarsus from the underlying tissue. With a pair of scissors the tarsal plate is cut into numerous vertical strips which are crushed with roller forceps. The conjunctiva is then

sutured back in place. The tarsus shrinks into a thin cicatricial membrane and thus, it is claimed, relieves the cornea from pressure.

ALLING.

XIII.—THE CORNEA AND SCLERA.

82. BRUNETIÈRE and AMALRIC. **Grave hemorrhage following an extensive injury of the sclerotic. Suture. Recovery.** *Clinique Ophtalmologique*, viii., 5.

83. BUXTON, L. H. **Dumb-bell keratitis.** *Ophthalmology*, April, 1917.

84. DERBY, G. S. **Interstitial keratitis—with special reference to the end results.** *Ophthalmic Record*, November, 1917.

85. MAGITOT, A. **Kerato-conjunctivitis accompanied by nasal lesions.** *Annales d'Oculistique*, cliii., 6.

86. MAGITOT, A. **A critical study of certain biological properties of the corneal tissue and of human keratoplasty.** *Ibid.*, cliii., 9 and 10.

87. STEPHENSON, S. **A note upon the pseudo-neoplastic form of interstitial keratitis.** *British Journal of Ophthalmology*, December, 1917.

88. VERHOEFF, F. H. **The treatment of hypopyon keratitis.** *Journal of the American Medical Association*, June 30, 1917.

89. WALKER, SYDNEY. **Present status of corneal transplantation and some experimental data.** *Ophthalmic Record*, August, 1917.

90. WIENER, M. **A new operative method for the relief of advanced cases of keratoconus.** *Journal of the American Medical Assoc.*, September 8.

BUXTON (83, **Dumb-bell keratitis**) has seen three cases of corneal ulcer which he calls by the above title. A small ulcer appears about *2mm* below the upper sclero-corneal junction, and from this a line extends perpendicularly to a similar ulcer near the lower margin. The process in the two knobs seems to be a destruction of the epithelium down to Bowman's membrane, but only of the superficial epithelium in the connecting line. There is very little local reaction and the ulcers heal in a few weeks. He does not think that the process is allied to dendritic keratitis but is rather neuropathic and of herpetic nature.

ALLING.

DERBY'S (84, **Interstitial keratitis—with special reference to the end results**) study of ninety-six cases, with a total of 190 eyes, shows the following results: Corneal opacities of every degree of density were found in 168 eyes. Vascularization was absent in only fifteen and seems to be permanent.

It was observed in one case fifty-five years after the original inflammation. Evidence of iritis was found in sixty-two eyes. It would appear however that its occurrence bears no relation to the severity of the keratitis. In four cases slight opacity of the lens was found. Vitreous opacities were present in a few cases and in 55% lesions of the choroid and retina were found. These lesions sometimes antedate the corneal process. Vision in 161 eyes examined was less than 1/10 in twenty-five. Regarding the cases of typical interstitial keratitis the author is of the opinion that they are, with few exceptions, syphilitic. In thirty-seven cases carefully investigated, evidence of recurrences was found. In spite of the discouraging results, antisyphilitic treatment should be thoroughly carried out.

ALLING.

The rare cases described by STEPHENSON (87, **A note upon the pseudo-neoplastic form of interstitial keratitis**) all occur in children affected with congenital syphilis. The appearances are constant and may be described as follows: Occupying the upper or the lower part of the cornea there is a somewhat prominent, fleshy-looking mass, having the appearance of a neoplasm. The cornea adjoining the mass has shown interstitial deposits, or the whole cornea not occupied by the mass has the appearance of aggressive interstitial keratitis. In course of time the mass has flattened down and there has been no tendency to bulging. The cases follow the normal course of interstitial keratitis.

The disease may be confused with a tumor growth. The age of the patient and the presence of syphilis should help the diagnosis.

T. HARRISON BUTLER.

MAGITOT (85, **Kerato-conjunctivitis accompanied by nasal lesions**) has seen a large number of soldiers with this trouble. The examination of one hundred cases of kerato-conjunctivitis by a rhinologist revealed the following percentages of nasal troubles. Acute rhinitis, 30%; atrophic rhinitis, 5%; tertiary lues in the nose, 7%; maxillary or frontal sinusitis, 13%; nasal polypi, 3%; septal deviations, 25%; hypertrophy of inferior turbinates, 15%. The ocular condition presents certain peculiarities: the conjunctiva is congested, but does not

secrete mucus, the cornea is slightly hazy and the limbus shows a few small and superficial ulcerations. The process disappears after a few weeks but reappears later on. The condition is cured only after the nasal trouble is relieved. The author thinks that this type of kerato-conjunctivitis is due to a reflex nervous irritation starting in the nose. He was able to cure it completely only after the patient underwent the proper nasal treatment.

SCHOENBERG.

VERHOEFF (88, **Treatment of hypopyon keratitis**), after reviewing the various means of treating ulcers and demonstrating their ineffectiveness, explains his own procedure. He makes a crucial incision through the base of the ulcer and then allows a highly concentrated Lugol's solution (25% iodine) to lie in contact with the ulcerated area for about five minutes, flushing it out with boric acid solution. In very small ulcers the solution is applied without the incision, but in rapidly progressive cases he thinks the Saemisch incision is necessary. He has treated forty-two cases and in only eight of the severer ones did the method fail to check the process.

ALLING.

MAGITOT (86, **A critical study of certain biologic properties of the corneal tissue and of human keratoplasty**) says that experience has taught us the following practical points: (a) the excision of a portion of a leucomatous cornea is followed by a regeneration of opaque tissue if the area surrounding the excised piece was opaque; (b) the ablation of a leucomatous piece of cornea together with a portion of surrounding healthy tissue may be followed by a regeneration of transparent tissue; (c) if a disk of leucomatous cornea is transplanted on a healthy cornea we find after a few months that the transplanted piece is very much more transparent. Regarding the question of grafting pieces of clear cornea on a leucomatous cornea the author reiterates what he said in previous papers. *Autoplasty*, using cornea from the same patient, has the greatest chance of success, 95%; *homoplasty*, using a piece of cornea of another individual, succeeds in about 60%; *heteroplasty*, the grafting of cornea from a different species, has never succeeded. Besides the origin of the graft, the question of perfect technic and the clinical condition of the cornea of the

patient determine the success or failure of the attempt. Of all the leucomas those due to burns, ulcers, and pterygium are the most suitable for grafting. Experience has shown that leucoma due to trachoma, interstitial keratitis, or pemphigus is not suitable for an operation. Regarding the technic he advises to have the graft much thinner than the opaque piece which is to be replaced, because it swells up as soon as it comes in contact with the tears and projects above the surface of the cornea on which it is grafted, a condition which favors its easy displacement. The author uses a Bowman trephine of about 4 to 5*mm* diameter and a very sharp angular knife which cut the lamellæ of the cornea with ease and precision. Perfect asepsis is the first requisite for obviating failure. Very gentle handling of the graft avoiding its traumatism is a second requisite. Cocaine 2% instilled three times is sufficient to produce anæsthesia. An overdose of cocaine may injure severely the corneal epithelium. The after treatment is simple. Binocular bandage for forty-eight hours. Then, wet bandage over the operated eye. On sixth day the eyes are left open. The transplanted piece of cornea is slightly opalescent and gradually clears up almost entirely in four weeks. The author has made about forty keratoplasties and almost invariably had success in cases with leucomas due to burns, but failed just as invariably in those due to extensive ulcers. In two cases only he obtained a fair result by excising the opaque area entirely.

SCHOENBERG.

WALKER (89, **Present status of corneal transplantation),** after reviewing the literature, explains the technic which he has developed. He experimented upon dogs by cutting off a layer of the clear cornea from one eye and transplanting and suturing it over the cornea of the other eye, which was prepared by removing a similar piece. He then covered the whole cornea with a conjunctival flap. His first operations were failures because he entered the anterior chamber in making the section or because of the presence of too much blood under the flap. Finally he succeeded in obtaining three good results. He then operated upon three human eyes with leucomata. In the first the flap was not retained. In the second the graft held and only slight cloudiness and organizations were present.

In the third case the graft held and was cloudy but he expected it to clear. No details of the length of time which has elapsed since the operations are given. From his studies he concludes that transplantation of foreign bodies such as glass or of tissue from another species is doomed to failure, but fair results in selected cases may be obtained from grafts taken from the same individual or from another human eye.

ALLING.

WIENER (90, **Operation for keratoconus**) has operated upon both eyes of a patient as follows: he dissected up an elliptical flap of the cornea (8*mm* by 3*mm*) near the periphery above and passed sutures through holes in two thin gold plates, then through the edges of the wound. The plates prevent the stitches from tearing through. The flap included the whole thickness of the cornea except Descemet's membrane. The vision before the operation was $\frac{7}{200}$; after $\frac{15}{200}$.

BRUNETIÈRE and AMALRIC (82, **Grave hemorrhage following an extensive injury of the sclerotic. Suture. Recovery**) have seen a soldier with a large injury of the sclera measuring 9 to 10*mm*. It bled very profusely, but healed well after being sutured. The vision gradually improved from H.M. to $\frac{4}{10}$ and the tension became normal. The authors warn against a precipitated decision in favor of the enucleation of gravely injured eyes.

SCHOENBERG.

XIV.—THE IRIS AND CILIARY BODY.

91. DARIER, A. **The treatment of diseases of the iris and of the ciliary body in general.** *Clinique ophtalmologie*, viii., 1.

92. DAVIES, D. L. **Diseases of the eye of obscure origin.** *British Journal of Ophthalmology*, October, 1917.

93. DOR, L. **Anisocoria of bacillary origin.** *Clinique ophtalmologique* viii., 4.

94. LANE, L. A. **Primary progressive atrophy of the iris.** *Ophthalmic Record*, June, 1917.

95. MORAX, V. **Iritis observed during a small epidemic of dysenteriform intestinal infection.** *Annales d'oculistique*, cliv., 1.

96. ROUSSEAU, FERDINAND. **Researches concerning the etiology and pathogenesis of non-syphilitic iritis.** *Ibid.*, cliii., 4.

97. ZIMMER. **Double metastatic cyclitis following an attack of bubonic plague.** *Clinique ophtalmologique*, viii., 1.

DARIER (91, **Treatment of diseases of the iris**) makes a general review of the present methods of local and general treatment of iritis, iridocyclitis, and iridochoroiditis.

SCHOENBERG.

DOR (93, **Anisocoria of bacillary origin**) has seen several cases of anisocoria in tuberculosis of the apex of one lung. The pupil is dilated in the eye situated on the same side as the involved lung and the refraction becomes hypermetropic 1.25 D. He thinks that this sympathetic irritation mydriasis is characteristic of apical pulmonary tuberculosis just as the Argyll-Robertson pupil is pathognomonic for cerebrospinal syphilis.

SCHOENBERG.

MORAX (95, **Iritis observed during a small epidemic of dysenteriform intestinal infection**) reports two cases in which the infection was not due to either the amœba, or the bacillus of Shiga. Bacteriologists could not establish with accuracy the type of microörganism. The first patient had three attacks of iritis during his illness, each lasting only twenty-four hours.

SCHOENBERG.

FERDINAND ROUSSEAU (96, **Researches on the ætiology and pathogenesis of non-syphilitic iritis**) maintains that non-syphilitic iritis is either a metastatic condition or the first manifestation of an infectious disease. The diagnosis, ætiology, and pathology of non-syphilitic iritis are yet in great obscurity and the problems involved in these great questions are yet to be worked out clinically and experimentally. The clinical study of cases with non-syphilitic iritis shows that some are due to an infectious disease, tuberculosis, gonorrhea, rheumatism, tonsillitis, grip, etc., and others to disturbances of nutrition, as in gout and diabetes. The author thinks that ophthalmologists are not frequently justified to consider as tuberculous those cases with sluggish iritis and iridocyclitis of unknown origin. His researches, histological and by inoculations in rabbits and guinea pigs, have convinced him that they are far from being tuberculous. He is rather inclined to believe that this type of chronic iritis without any manifestations in the rest of the body is due to a pneumococcic infection which localizes itself from the blood in the iris only.

He tried in a series of experiments to produce experimental pneumococcic iritis by first reducing the vitality of the iris, by mechanical, thermal, and chemical injuries through the action upon the vasomotor and trophic nerves of the iris. The conclusions arrived at are that we do not know yet the reasons for the localization of a general infection on the iris. The pneumococcus may cause an experimental iritis even when injected in very small number, if the iris was already the seat of a previous inflammation. Recurrent iritis, if not luetic, is most frequently gonococcal. Acute exudative iritis, occurring during a rhinopharyngeal inflammation, is usually pneumococcal. Chronic iritis is not tuberculous; it has great analogy with sympathetic ophthalmia.

SCHOENBERG.

DAVIES (92, **Diseases of the eye of obscure origin**) emphasizes the now well accepted fact that a diagnosis of rheumatic or gouty iritis no longer satisfies the modern ophthalmic surgeon. He goes on to discuss the various septic sources which give rise to so-called rheumatic affections.

T. HARRISON BUTLER.

LANE'S (94, **Primary progressive atrophy of the iris**) patient, a girl of 20, noticed a small black hole in the iris about two years ago. Later other atrophic areas appeared until the iris was almost completely destroyed. During this time the eye was subject to attacks of inflammation and gradually became considerably reduced in size. The cornea became opaque and a glaucomatous state ensued. After a trephine operation the cornea cleared and vision improved. Later the other eye showed evidences of glaucoma which were relieved by treatment. Increased tension has been recorded in almost all cases previously reported and latent tuberculosis has also generally been suspected. The patient had acne for a number of years and autointoxication may have been a factor.

ALLING.

ZIMMER (97, **Double metastatic cyclitis following an attack of bubonic plague**) reports a case of this nature in which the patient recovered his general health but remained with his vision O. D. = L. P. = O. S. — O.

SCHOENBERG.

XV.—THE LENS.

98. BERNSTEIN, E. J. **An unusually long open wound after cataract extraction.** *Annals of Ophthalmology*, April, 1917.

99. FISHER, J. H. **A note on cataract extraction with a suggestion.** *British Journal of Ophthalmology*, December, 1917.

100. GROS, H., and FROMAGET, H. **Two cases of subchoroidal, expulsive hemorrhages during cataract extraction. Attempt at prophylactic treatment.** *Annales d'oculistique*, cliii., 11.

101. YOUNG, G. **On macular perception in advanced cataract.** *British Journal of Ophthalmology*, June, 1917.

BERNSTEIN (98, **Unusually long open wound after cataract extraction**) operated successfully on a patient 87 years old but on the third day found the lower lid turned in and the wound gaping. The iris was repeatedly prolapsed but could be replaced. After a month he covered the wound with a conjunctival flap but it did not heal. Two months later the wound was not entirely healed and the eye had developed iridocyclitis.

ALLING.

FISHER (99, **A note on cataract extraction with a suggestion**) places a drop or two of a 1% solution of atropine in the conjunctival sac just before he makes the section. Some of the solution enters the anterior chamber, and a rapid and full dilatation of the pupil takes place.

We think that if this method be adopted the surgeon should personally sterilize the solution.

T. HARRISON BUTLER.

GROS and FROMAGET (100, **Two cases of subchoroidal, expulsive hemorrhages during the cataract extraction**) have met with two cases of expulsive hemorrhage following a cataract operation. Believing that this complication is due both to a degenerative condition of the choroidal vessels and sudden reduction of the intraocular pressure, they recommend as a prophylactic measure a preliminary sclerectomy and the use of pilocarpine two weeks before the cataract operation. They practiced this procedure on the second eye of a patient who had lost the first one by an expulsive hemorrhage and obtained a very satisfactory result. The sclerectomy should be performed in the region of the equator. The lowering of the tension prepares the choroidal circulatory system for a further

sudden diminution of the ocular tension occurring during the cataract operation.

SCHOENBERG.

It is difficult to ascertain the soundness of the macular perception in cataract cases, and yet it would be very useful to be able to do so before performing an operation. YOUNG (101, **On macular perception in advanced cataract**) has succeeded in gaining valuable information in these cases by using disks with one, two, and three perforations which are all within a central area of less than three millimeters. These are placed in succession in the trial frame, and the eye is brought near to the frosted focus light of a Thorington's chimney with the diaphragm widely open. The patient is told to look out for the "moons," and then the disks are rotated. An intelligent patient will be able to state the position of the moons. Young thinks that this test would reveal a defective macula.

T. HARRISON BUTLER.

XVI.—THE CHOROID.

102. VALENTINE, J. A. **A case of leucosarcoma of the choroid with epithelioma of the lip in the same patient.** *British Journal of Ophthalmology*, September, 1917.

This case is recorded by VALENTINE (102, **A case of leucosarcoma of the choroid with epithelioma of the lip in the same patient**) because of the rarity of two growths of different kinds in the same patient.

T. HARRISON BUTLER.

XVII.—SYMPATHETIC OPHTHALMIA.

103. MORAX, V. **Sympathetic ophthalmia.** *Annales d'oculistique*, cliv., 6.

104. WEEKERS, L. **War's lesson on sympathetic ophthalmia.** *Ibid.*, cliv., 4.

MORAX (103, **Sympathetic ophthalmia**) has seen one single case of sympathetic ophthalmia among 1500 soldiers with injuries of the eyes and expresses his entire agreement with Weekers, who, in a paper published on the same subject, states that this disease occurs very rarely. Morax gives the

clinical history and microscopical specimens of the enucleated eye as evidence for the correctness of the diagnosis. The majority of the thirty cases of sympathetic ophthalmia that the author has seen during twenty years have developed, just as the case reported in this paper, after infection following operations on the eye, and he is very much inclined to believe in the infectious nature of this disease. He says that the prompt enucleation of eyes with an iridocyclitis following an infection after a cataract extraction is still the best method of preventing sympathetic ophthalmia as it was in the times of Mackenzie, who was the first to recommend this operation.

SCHOENBERG.

WEEKERS (104, **War's lesson on sympathetic ophthalmia**) states that according to German authors sympathetic ophthalmia occurred in 55% of the ocular injuries incurred during the Franco-Prussian war of 1870. During the present war, in which the proportion of eye injuries in relation to other injuries is very much larger, sympathetic ophthalmia is almost unknown. The question of the rarity of this complication came up for discussion before the French and British ophthalmologists and the explanation given by most of the authorities was that the rarity of its occurrence is due to two facts: early enucleation and the use of antisepsis. Weekers believes that the German statistics regarding the high frequency of sympathetic ophthalmia are not tenable under our present clinical conception of this condition. Eliminating all the cases with functional disturbances in the non-injured eye, such as lacrimation, photophobia, asthenopia, etc., which have been included hitherto in the statistics, and the number of cases with sympathetic ophthalmia dwindles to a very small percentage even in the statistics of the Franco-Prussian war. Furthermore a careful reading of the papers published on this subject during that period reveals not a single observation in which a typical sympathetic uveitis is described. Taking his own experience with that of others he concludes that sympathetic ophthalmia is a very rare occurrence in peace as well as during war time. He believes that the very rare occurrence of this disease in modern times is due to the treatment promptly applied, to our present-day methods of antisepsis and asepsis, and to our more accurate diagnosis. The conser-

vation of an injured eye is preferable to its enucleation and since sympathetic ophthalmia is to be feared much less than it used to be a conservative attitude is justifiable. Whenever the removal of the eye is indicated he prefers exenteration to enucleation, because a better prothesis can be applied after this procedure.

SCHOENBERG.

XVIII.—GLAUCOMA.

105. CLEGG, J. G. **Sclerocorneal trephining for hypertony: an experience of two hundred and fifty operations.** *British Journal of Ophthalmology*, September, 1917.

106. EWING, A. E. **Postciliary scleral trephining for glaucoma.** *American Journal of Ophthalmology*, July, 1917.

107. MORAX, V. **Secondary glaucoma developing in eyes containing foreign bodies.** *Annales d'oculistique*, cliv., 1.

108. SANSUM, W. D. **Rapid reduction of intraocular tension in glaucoma.** *Journal of the American Medical Association*, June 23, 1917.

The intravenous injection of glucose is known to produce diuresis and dehydration of the tissues, at the same time raising the blood pressure. SANSUM (108, **Rapid reduction of intraocular tension in glaucoma**) experimented upon two cases of glaucoma and found that intraocular tension was lowered under the treatment. The method is susceptible to control and might be of use where it was desirable to produce a rapid decrease in tension preliminary to operation.

ALLING.

MORAX (107, **Secondary glaucoma developing in eyes containing foreign bodies**) has seen, out of 1000 eye injuries, five cases of secondary glaucoma in eyes containing foreign bodies. Literature reports very few similar cases and the author concludes from his own five observations that the presence of a foreign body in the vitreous may give rise to hypertension even without any signs of cyclitis. Furthermore cases of chronic glaucoma following an injury of the eye, in which the media are so changed that an ophthalmoscopic examination is not possible, should have an X-ray study, since his observations show that the presence of a foreign body is not only possible but probable.

SCHOENBERG.

GREY CLEGG (105, **Sclerocorneal trephining for hypertony**) adopts the Elliot method with few modifications. He prefers the Harrison Butler trephine and generally employs a diameter of two millimeters, but removes only the anterior portion of the disk. The conjunctiva is reflected as far as possible but true splitting of the cornea is not advised, for Clegg finds that an aperture covered by corneal tissue heals up solidly. An iridectomy is not essential but is advisable. The conjunctiva is sutured.

The results obtained are as follows, the figures referring to visual acuity:

Acute Glaucoma:

Improved	70%
Stationary	25%
Worse	5%

Sub-Acute Glaucoma:

Improved	47%
Stationary	42%
Worse	11%

Simple Chronic Glaucoma:

Improved	32%
Stationary	48%
Worse	20%

The author notes that some of the bad results were due to the development of cataract which was not traumatic. He observes that if 80% be the true proportion of favorable results in chronic glaucoma it is superior to the 62% claimed for iridectomy.

T. HARRISON BUTLER.

EWING (106, **Postciliary scleral trephining for glaucoma**) suggests trephining the sclera between the superior and external recti muscles. He operated upon a painful eye in a state of absolute glaucoma, and after six weeks there was drainage through the opening and the eye was quiet. Another case of glaucoma simplex with tension 45 with cupped disks and slightly contracted field on the nasal side was similarly

treated and two weeks later showed tension 35 and relief of blurring. In three other cases, one simple glaucoma and two blind aphakic eyes, the operation was performed with satisfactory results. The points in favor of the procedure are the ease and lack of trauma, slow drainage, less liability to hemorrhage, no deformity of the pupil, no risk to the lens protection of the wound by the upper lid, and possible repetition if necessary.

ALLING.

XIX.—THE RETINA.

109. BAILLART, P. **The circulation in the retinal artery. An attempt to determine the arterial tension in the branches of the central artery of the retina.** *Annales d'oculistique*, cliv., 5.

110. BARDSLEY, P. C. **The retinal signs of arteriosclerosis compared with those due simply to increased blood pressure.** *British Journal of Ophthalmology*, April, 1917.

111. BLAKE, E. M. **A case of reattachment of the retina. Trephine operation.** *Ophthalmic Record*, November, 1917.

112. FRENKEL, H. **Circular folding of the retina produced by contusion of the posterior segment of the eyeball.** *Annales d'oculistique*, cliv., 1.

113. GRIFFITH, A. H. **Hereditary glioma of the retina.** *British Journal of Ophthalmology*, September, 1917.

114. LAWSON, A. **A case of detachment of the retina at the ora serrata.** *Ibid.*, October, 1917.

115. PRINGLE, J. A. **Multiple aneurysms of the retinal arteries.** *Ibid.*, February, 1917.

116. TAYLOR, F. E., and FLEMMING, B. B. **Bilateral glioma of the retina with multiple metastases.** *Ibid.*, February, 1917.

BLAKE'S (111, **Reattachment of the retina**) case, a girl of 13, had a traumatic detachment with vision reduced to hand movement in the lower part of the field. Ten months after trephining of the sclera the vision was found to be $\frac{20}{100}$ and no detachment was seen.

ALLING.

LAWSON (114, **Detachment of the retina at the ora serrata**) reports a case of detachment of the retina at the ora serrata which followed as the result of a bomb which burst close by wounding the subject in several places but not in the eye.

T. HARRISON BUTLER.

Marcus Gunn in his classical paper upon the retinal signs of arteriosclerosis (*Trans. Ophth. Soc. U. K.*, vol. xviii.) laid down four cardinal signs:

(1) A tendency to *tortuosity of the arteries*, especially the small ones.

(2) *Variation in the caliber* of the vessels, especially sudden diminution for a short length.

(3) *Alteration in the normal light streak* which becomes much brighter and more sharply defined.

(4) *Indentation of the veins* by the hardened artery. Considerable indentation is followed by obstruction with all its sequelæ. These classical observations have been confirmed by hundreds of observers, and no additional sign of any importance has been discovered. De Schweinitz emphasizes the brick-red coloration of the disk as a late but important sign.

Gunn was one of the first to note that these signs were not confined to old age, and that old age was not the sole cause of the changes.

At first the prognosis was regarded as very bad, but the author some years ago came to the conclusion that this view must be modified. In following up the history of these patients he found that some with advanced mischief, even with retinal œdema and hemorrhages, improved marvelously, and was still more surprised to note that in some the cardinal signs disappeared.

This view is strikingly confirmed by a case which is cited. A patient of Dr. Crofton, aged 60, had general symptoms of arteriosclerosis. He was examined by Mr. Worth who discovered advanced signs of arteriosclerosis in the retinal arteries including the "silver wire" appearance. After three months' treatment Worth found that the retinal arteries were normal for a man of his years. BARDSLEY (110, **Retinal signs of arteriosclerosis**) has observed these changes occur with *startling rapidity* even in a day or two! He was forced to the conclusion that the classical Gunn signs do not *necessarily* denote arteriosclerosis. His researches upon the blood pressure of these patients has led him to the conclusion that high blood pressure alone can account for some of the classical signs. He can now distinguish with the ophthalmoscope the signs which belong to sclerosis and those proper to high pressure.

In simple high tension:

(1) The vessels have the appearance of *uniform* distention.

(2) The light streak is *broadened* out: it may be greatly expanded covering the whole breadth of the vessel.

(3) The light streak is much brighter than normal, the brilliancy increasing with the tension until at a very high record it becomes like bright copper wire, not silver wire.

(4) The tight arteries indent veins. The degree of indention is proportional to the pressure.

The following signs indicate actual sclerosis:

(1) *Irregular* tortuosity, especially of the smaller twigs.

(2) Increased brilliancy of the light streak, which at the same time appears to be *narrower* and more central.

(3) Irregularity of caliber and beading are sure signs of sclerosis.

(4) General diminution in the size of the vessels and a "silver wire" appearance indicate advanced sclerosis.

Naturally the conditions of high tension and sclerosis often coincide but by no means always.

Conditions of acute toxæmia give the same ophthalmoscopic picture as that seen in cases with hypertension although the blood pressure is low.

T. HARRISON BUTLER.

The study of the disturbances of blood pressure in the retinal vessels has not passed even the threshold of speculation and theorizing, and, yet, its clinical significance is of vast importance. BAILLART (109, **An attempt to determine the arterial tension in the branches of the central retinal artery**) has tried to work out a practical method of measuring the blood pressure in the retinal blood-vessels by applying on the eyelid the sphygmomanometer of Bloch-Verdin, specially adapted for the eye by Cheron. A gradually increasing amount of pressure, measurable by the apparatus, is applied by an assistant on the eyeball while the observer watches the retinal arteries with the ophthalmoscope, using the indirect method. The moment the arteries begin to pulsate, the first reading on the sphygmomanometer is noted, which indicates the amount of pressure exerted on the eyeball that overcomes the diastolic pressure in the retinal vessels. Then, the pressure is increased until the pulsation ceases entirely, and again gradually released till the pulsation reappears. That moment a second reading of the sphygmomanometer is made, which

indicates the systolic pressure in the retinal vessels. Adding to each of these two readings the intraocular pressure, obtained beforehand with a tonometer, we obtain the systolic and diastolic blood pressure in the retinal blood-vessels. The author has examined by this method fifty healthy individuals between 25 and 47 years of age and found an average of 67*mm* diastolic and 98*mm* systolic pressure. In another series of younger individuals he found 61*mm* and 86*mm* respectively.

SCHOENBERG.

FRENKEL'S (112, **Circular folding of the retina produced by contusion**) patient, an infantry sergeant, was exposed to terrific explosions of shells in the trenches and, without having been hit, he noticed that his right eye was blind. He reported for medical examination about eight months later and the diagnosis was made of optic neuritis and chorioretinitis in the right eye. Wassermann positive. After a few months of antiluetic treatment he came under the observation of the author who found a peculiar condition of the fundus, consisting of a partial optic atrophy and five white circles arranged above and below the papilla. Two such circles above the papilla, each the size of about 1*mm* showed a few small white dots along the arteries passing within the zone of these circles. Two of the lower circles are somewhat larger than the upper ones; one of them presented at its lower periphery a hemorrhage, partly absorbed. The retina adjoining it was whitish. Finally a fifth line, occupying three fourths of a circle, situated in the inner lower quadrant of the fundus, presented three whitish patches, probably due to old hemorrhages. The left eye was normal. The author regards this unusual condition as due to circular folds of the retina, produced by the impact of the posterior pole of the eyeball against the tip of the orbit during a sudden increase of air pressure, caused by the forceful explosions of shells at a very short distance away, about two meters.

SCHOENBERG.

Aneurysms of the retinal arteries, apart from those variations in caliber associated with arterial disease, are extremely rare. PRINGLE (115, **Multiple aneurysms of the retinal arteries**) reports the following case. Private C. J., aged 23, had noted defective vision for eighteen months. V. R. $\frac{4}{5}$; V. L. $\frac{6}{5}$.

Left Fundus. On following the superior temporal vessels outwards to a distance of about three disk diameters a large leash of medullated nerve fibers begins to make its appearance.

Just below this leash in the course of the lower branch of the superior temporal artery a string of aneurysms is seen. These with the vessel give the appearance of a Higginson's syringe with multiple bulbs. The condition is clearly shown by a beautiful colored plate of the fundus. The disease is very rare, and no ophthalmologist should fail to examine this instructive drawing. Unfortunately no mention is made of a Wassermann test.

T. HARRISON BUTLER.

TAYLOR and FLEMMING (116, **Bilateral glioma of the retina with multiple metastases**) describe a case of a child aged three who died from glioma in each retina with metastases in the meninges, bones, mesenteric glands, ovary, and elsewhere. The metastatic growths had the characters of a small round-celled sarcoma. The primary growth in the retina showed no neuro-epithelial rosettes. Photographs of the excised eyes and of the microscopic sections are included in the paper.

T. HARRISON BUTLER.

GRIFFITH (113, **Hereditary glioma of the retina**) gives an account of two families in which glioma retinæ in the mother was transmitted to several children.

The Smith Family: Mother, aged 22, had had the right eye removed for glioma, by Mules, when nine months old.

Mrs. Smith had six children four of whom developed double glioma.

The Jones Family: Mother had the right eye removed for glioma, by Glascott, when two and a half years old.

There were three children; two had unilateral glioma and one bilateral.

Griffith states that all the eyes showed typical glioma retinæ. He states that he can only find records of six other examples of this tragic inheritance. In two the disease was transmitted from the father.

T. HARRISON BUTLER.

XX.—THE OPTIC NERVE AND VISUAL TRACT.

117. Bourguet and Ronnaux. **Bilateral optic neuritis cured by a puncture of the corpus callosum.** *Annales d'oculistique*, cliii., 7.

118. Dor, L. **Retrobulbar neuritis.** *Clinique ophtalmologique*, viii., 5.

119. Jocqs. **Retrobulbar neuritis and multiple sclerosis.** *Ibid.*, viii., 5.

120. Lenoir, W. **Acute infectious retrobulbar neuritis; semeiology and complications.** *Annales d'oculistique*, cliv., 2.

121. Menacho, M. **Congenital pigmentation of the optic nerve.** *Ibid.*, cliv., 5.

122. Sollier, P., and Jousset, X. **Nitro-phenol optic neuritis.** *Clinique ophtalmologique*, viii., 2.

Bourguet and Ronnaux (117, **Bilateral optic neuritis cured by a puncture of the corpus callosum**) report the following case. The patient, a war prisoner, 24 years of age, complained of headaches and loss of sight following an attack of grippe. His vision was O. D. = P. L. O. S. $\frac{3}{30}$. The ophthalmoscopic examination revealed a bilateral optic neuritis. No other neurological symptom. With the assumption that the grippe produced an obstruction of the foramen of Magendie through which the cerebrospinal fluid flows from the fourth ventricle into the subarachnoid space, followed by an increase of intracranial pressure and optic neuritis, the authors decided to establish an artificial communication between the lateral ventricles and the subarachnoid space. For this purpose they punctured the corpus callosum, under local anæsthesia, and obtained an almost immediate improvement. The vision returned to normal in a few weeks and the papillitis cleared up very rapidly.

Schoenberg.

Dor (118, **Retrobulbar neuritis**) is convinced that in nineteen times out of twenty the cause of retrobulbar neuritis lies in an inflammatory condition of the roots of the two upper bicuspids and a periostitis surrounding them. The diseased teeth are on the same side as the affected eye. The simplest way to find out the tooth trouble is to press upon the gums in the region of the bicuspids. Pressure elicits pain if there is a periostitis. He advises dentists always to extract diseased bicuspids, never to fill them.

Schoenberg.

Jocqs (119, **Retrobulbar neuritis and multiple sclerosis**) publishes the history of a case who had a retrobulbar neuritis

of one eye and a large central scotoma. The condition cleared up entirely in about two months. Ten years later the patient developed multiple sclerosis.

SCHOENBERG.

Based on sixteen observations LENOIR (120, **The acute infectious retrobulbar neuritis**) summarizes the salient points of characterizing the acute infectious retrobulbar neuritis. Twelve of his patients gave no history of any infection preceding or accompanying the eye trouble, four had rhinitis. The vision was abolished entirely in three, reduced to perception of light in six, and below $\frac{1}{20}$ in two. Improvement usually began at the end of the first week. The ophthalmoscopic changes depend on the seat of the inflammatory process, and the author classifies his cases in two types: *anterior* or *juxtabulbar*, in which the inflammation is very near the eyeball, and *posterior*, when the process is farther back, behind the point of entrance of the retinal blood-vessels.

In six cases there was an optic neuritis, in three papillitis, in two hyperæmia of the optic disk. The others showed no ophthalmoscopic changes. The changes in the visual field were: absolute central scotoma in ten, irregular contraction of the visual field in three, relative central scotoma in one. The usual course was benign. It cleared up entirely in from four to eight weeks. The author warns the reader to exclude multiple sclerosis, syphilis, and Leber's hereditary optic atrophy before a definite diagnosis is made of acute infectious retrobulbar neuritis.

SCHOENBERG.

SOLLIER and JOUSSET (122, **Nitro-phenol optic neuritis**) have seen fifteen workers from munition factories, who after handling nitro-phenol for several months began to complain of cloudy vision, cramps, and pricking sensation in the legs. The ophthalmological examination revealed the existence of a retrobulbar neuritis which usually ended in an optic atrophy. The authors believe that this neuritis is due to the toxic action of the nitro-phenol. The condition develops very slowly and a discontinuation of the work at an early period of the trouble is very important for its successful treatment. All the cases reported in this paper came under observation months after the visual trouble had begun. SCHOENBERG.

MENACHO (121, **Congenital pigmentation of the optic nerve**) reports on a case of annular pigmentation of the optic disk. There was also a patch of thin sclera with the choroid showing through near the upper margin of the cornea. He believes that the coincidence of the pigmentation on the disk with the aplasia of the sclera speaks in favor of a disturbance of embryonic origin and assumes that the pigment had its origin from an inclusion of a portion of the pigment-epithelium layer of the retina.

SCHOENBERG.

XXI.—ACCIDENTS, INJURIES, FOREIGN BODIES, PARASITES.

123. COSSE and DELORD. **Right homonymous hemianopsia complicated by a left inferior quadrant bilateral hemianopsia.** *Annales d'oculistique*, cliv., 2.

124. DOR, L. **Intraocular foreign bodies.** *Clinique ophtalmologique.* viii., 4.

125. EATON, E. M. **The more accurate determination of the position of foreign bodies in their relations to the eyeball and its component structures.** *British Journal of Ophthalmology*, December, 1917.

126. FRENKEL, H. **Traumatic syndrome of the anterior segment of the eyeball.** *Annales d'oculistique*, cliii., 6.

127. MILLER, G. V. **Injury to the eye complicated with abscess of the brain terminating fatally; autopsy; two cases.** *British Journal of Ophthalmology*, December, 1917.

128. MORAX, V. **Remarks on the prognosis and technique of extraction of intraocular magnetic foreign bodies.** *Annales d'oculistique*, cliii. 10.

129. MORAX, V. **Multiple intracranial projectiles causing a variety of ocular syndromes: homonymous hemianopsia, neuroparalytic keratitis, paralysis of associated movement to the right.** *Ibid.*, cliv., 5.

130. MORAX, V., and MOREAU, F. **The ætiology of injuries of the eyes by projectiles of war.** *Ibid.*, cliii., 8.

131. PETIT, P. **Remote consequences of war injuries of the eye and of intraocular foreign bodies.** *Ibid.*, cliii., 7.

132. PETIT, P. **Two cases of burns of the eye with a caustic liquid.** *Ibid.*, cliii., 11.

133. SCHNEIDER, E. R. **Cases of tetanus following ocular injuries,** *Ibid.*, cliii., 9.

134. SHUMWAY, E. A. **Contusion of the eye with rupture extending across the optic nerve.** *Ophthalmic Record*, April, 1917.

DOR (124, **Intraocular foreign bodies**) relates his results in twenty cases of foreign bodies in the vitreous treated during

twelve months: four enucleations; four remained with an atrophic eyeball; seven eyes conserved retaining their normal appearance, but with intraocular hemorrhages, susceptible of absorption; two cases remained with a traumatic cataract, of which one was successfully operated on, while no intervention was made in the other; three eyes were preserved with a vision above $\frac{1}{10}$.

SCHOENBERG.

EATON'S (125, **The more accurate determination of the position of foreign bodies in their relation to the eyeball and its component structures**) paper is highly geometrical and cannot well be abstracted without the reproduction of the numerous diagrams.

T. HARRISON BUTLER.

MORAX (128, **Prognosis and technique of extraction of intraocular magnetic foreign bodies**) states that of fifty-nine cases of foreign bodies in the vitreous thirteen ended in enucleations, eighteen remained with zero or very poor vision, twenty with useful vision, and eight recovered completely. Of fifteen cases with foreign bodies in the lens, iris, or anterior chamber, one eye had to be enucleated, one remained blind, four had satisfactory vision, and nine gave very good results. The prognosis was best in eyes with small foreign bodies, weighing from three to five milligrams. Regarding the preference some authors have for the giant over the small magnet, or vice-versa, Morax thinks that both are necessary, but that the small magnet is the most indispensable.

SCHOENBERG.

PETIT (131, **Remote consequences of war injuries of the eye and of intraocular foreign bodies**) advises that patients with such injuries should be carefully watched for a long time, even if the eye appears perfectly calm. He has seen about forty cases in which the X-ray or clinical examination did not reveal the presence of a foreign body in the eye. Later on when the enucleation became necessary, minute particles were found in the ciliary body, vitreous, etc.

SCHOENBERG.

MORAX and MOREAU (130, **The ætiology of injuries of the eyes by projectiles of war**) call attention to the fact that in

this war there has been a larger percentage of eye injuries than in any other war. Of 697 eye injuries, the most frequent (341) were due to fragments of shells; and the least frequent to bombs and rifles. The eyes are injured to a greater or less degree by direct or indirect contusion, rupture of the ocular tissues, infection, trauma or section of the optic nerve or of the oculomotor nerves, or the vision is impaired by intracranial lesions of the visual paths or centers. The amount of damage sustained by the ocular tissues depends very much on the size and velocity of the foreign body. They classify the foreign bodies according to their weight: large, 5 to 10 grams, medium, 0.30 to 5 grams, small, 0.001 to 0.25 grams. Of the 341 cases 75 were due to large, 96 to medium, and 170 to small-sized fragments of projectiles. The functional impairment resulting from the eye injuries in 697 cases was as follows: (1) 33 cases of trauma of the cranium resulting in 14 in a permanent homonymous hemianopsia; (2) 293 enucleations; (3) vision reduced to less than $\frac{1}{20}$ in 194 cases; (4) vision reduced to $\frac{1}{10}$ to $\frac{1}{20}$ in 36 cases; (5) only 160 have recovered vision to a useful degree. Regarding the prevention of entrance of these foreign bodies into the visual organs, the authors are very much in favor of various protective spectacles devised for such a purpose since the beginning of the war.

SCHOENBERG.

MORAX (129, **Multiple intracranial projectiles causing a variety of ocular syndromes: homonymous hemianopsia, neuroparalytic keratitis, paralysis of associated movement to the right**) reports the history of a soldier, wounded in the right occipital region by a fragment of a shell, who developed a multiplicity of symptoms of unusual interest. The symptoms following the injury were during the first month: loss of memory, inability to stand erect or to walk, marked diminution of vision to movements of the hand at 50*cm.* Wound on the right side of the occipital region entirely healed. X-ray picture revealed the presence of two foreign bodies; one in the region of the tentorium cerebelli "on the median line" and one in the posterior portion of the right occipital lobe. During the second month of illness the vision became normal and the general condition improved, but a slight attack of paralysis of the right trigeminus and left facial nerve appeared with a

mild neuroparalytic keratitis on the same side. Left homonymous hemianopsia, fundus normal, inability to look to the right. Some disturbance of gait and tendency to turn around, cerebellar. About two and a half months after the injury the patient became suddenly prostrated, complained of slight headache, and died the same night. The autopsy revealed: (1) Subdural hæmatoma at a point corresponding to the scar of the scalp in the occipital region. (2) Purulent meningitis, mostly developed in the region of the cerebellum. (3) The presence of three foreign bodies. One, in the right occipital lobe, surrounded by a hemorrhagic mass. Another, after injuring very gravely the brain substance of the occipital lobe, was arrested under the tentorium cerebelli. The third, in the right cerebellar hemisphere, surrounded by a purulent mass. This was the starting point of the suppurative meningitis. The author explains the visual and motile disturbances in the following manner: (1) The left hemianopsia was due to the injury of the right occipital lobe. (2) The neuroparalytic keratitis was produced by the suppurative process in the right cerebellar lobe, extending on the right side of the pons at the point of emergence of the fifth cranial nerve. (3) The paralysis of associated movements to the right may be attributed to the cerebellar abscess or to the involvement of the nucleus of the right sixth nerve. The latter appears more probable to the author. It is worth noticing that there were no nystagmus, no papillœdema, fever, or any other symptoms pointing to a cerebellar abscess. Pulse and temperature remained normal throughout.

SCHOENBERG.

COSSE and DELORD (123, **Right homonymous hemianopsia complicated by a left inferior quadrant bilateral hemianopsia**) report the case of a soldier, who had been wounded in the occipital region by a fragment of a shell, and had a normal acuity of vision but behaved like a blind man on account of his field of vision. All that was left of the field was a quadrant in the upper left portion. The condition was stationary for three months, during which time he was under observation. No other neurological symptoms. The X-ray examination revealed the presence of a depression of the occiput in the median line, the seat of a trephining performed after the injury,

and two spicules of bone, one on each side, localizable, according to the method of Marie and Chatelin, above the visual centers at the tip of the occipital lobes. The injury of the brain tissue must have extended to the upper margin of both calcarine fissures, in order to give the extensive loss of the visual field. The case is almost unique in literature, one similar case reported by Sack being mentioned by Rochon-Duvigneaud in the French *Encyclopédie d'Ophtalmologie.*

SCHOENBERG.

FRENKEL (126, **Traumatic syndrome of the anterior segment of the eyeball**) describes under this title the following group of symptoms: (1) Superficial loss of substance of the skin around the orbit. (2) Small perforation at the limbus corneæ and small iridodialysis. (3) Subluxation of the lens. (4) Subcapsular opacity. (5) Normal fundus but vision markedly reduced from $\frac{1}{20}$ to $\frac{1}{50}$. He reports twelve cases with this syndrome.

SCHOENBERG.

The rarity of such cases induced SCHNEIDER (133, **Tetanus following ocular injuries**) to publish the history of his own patient. A man 36 years of age was hit with a whip in the left eye which caused a perforating injury of the cornea with prolapse of iris. About three weeks after the accident he came to the hospital with panophthalmitis and beginning tetanus. He died three days later. He presented on his admittance in the hospital the characteristic symptoms of cephalic tetanus, difficulty in deglutition, trismus, and paralysis of the seventh nerve. The author reproduces from literature nineteen histories of cases of tetanus following injuries of the eyeball.

SCHOENBERG.

P. PETIT (132, **Burns of the eye with a caustic liquid**) reports the cases of two soldiers who were hit at the same time and probably by the same fragments of an enemy's shell. Both had severe superficial burns of the scalp, numerous small wounds of the lids, and deep perforating ulcerations of the cornea of one eye. Enucleation had to be performed in each case. The author thinks that the lesions were due to some caustic liquid, probably phosphoric acid.

SCHOENBERG.

MILLER (127, **Injury to the eye complicated with abscess of**

the brain) reports the following cases. A boy received a kick over the right eye during a game of football. There was a small laceration of the upper lid, the eye was uninjured. Three days later he was admitted to hospital. Eight hours later he died with cerebral symptoms. The autopsy showed a fracture of the osplanum of the ethmoid, and also of the cribriform plate. There was an abscess in the frontal lobes. The boy was 9 years old.

A girl aged 6 was struck upon the eye with a stick. There was a wound of the plica semilunaris. Four days later she had an attack similar to the first child with Cheyne Stokes breathing, from which she recovered. An incision was made next day, and pus evacuated from the orbit. Soon aphasia was noted and the left arm became paralyzed. The skull was trephined over the Rolandic area, but no pus was found. Eighteen days later the wound was opened up, and pus squirted out. A large hernia developed and the child died three months later.

A very extensive frontal abscess was found at the post-mortem examination.

T. Harrison Butler.

Shumway's (134, **Contusion of the eye with rupture extending across the optic nerve**) patient was struck in the eye with a stone. There was hemorrhage into both aqueous and vitreous chambers and the fundus could not be seen until five months later when the blood and exudate had disappeared. A connective tissue band was seen running across the lower outer quadrant of the disk which partly filled in a deep depression at the border of the nerve head. The blood-vessels were interrupted as they crossed this area and were much reduced in caliber beyond the band. The nerve was atrophic and the eye blind. The injury was evidently a tear across the nerve and separation of the tissues at the level of its entrance into the eyeball. Several cases of partial and complete avulsion of the optic nerve have been reported.

Alling.